



**Cyber-Deterrence:
The US Army
fights tomorrow's
war today.**

**Universal
Service:
An idea whose
time is past.**

September 1994

**Jon Katz:
Online or not,
newspapers
still suck.**

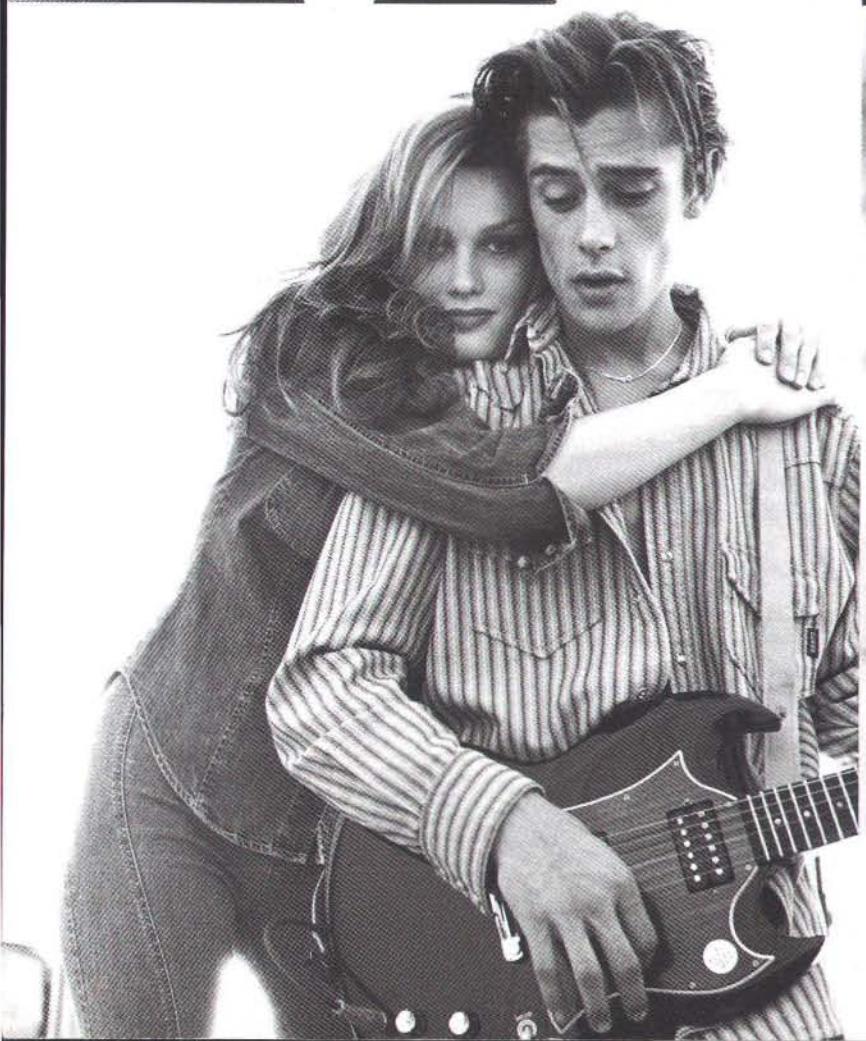
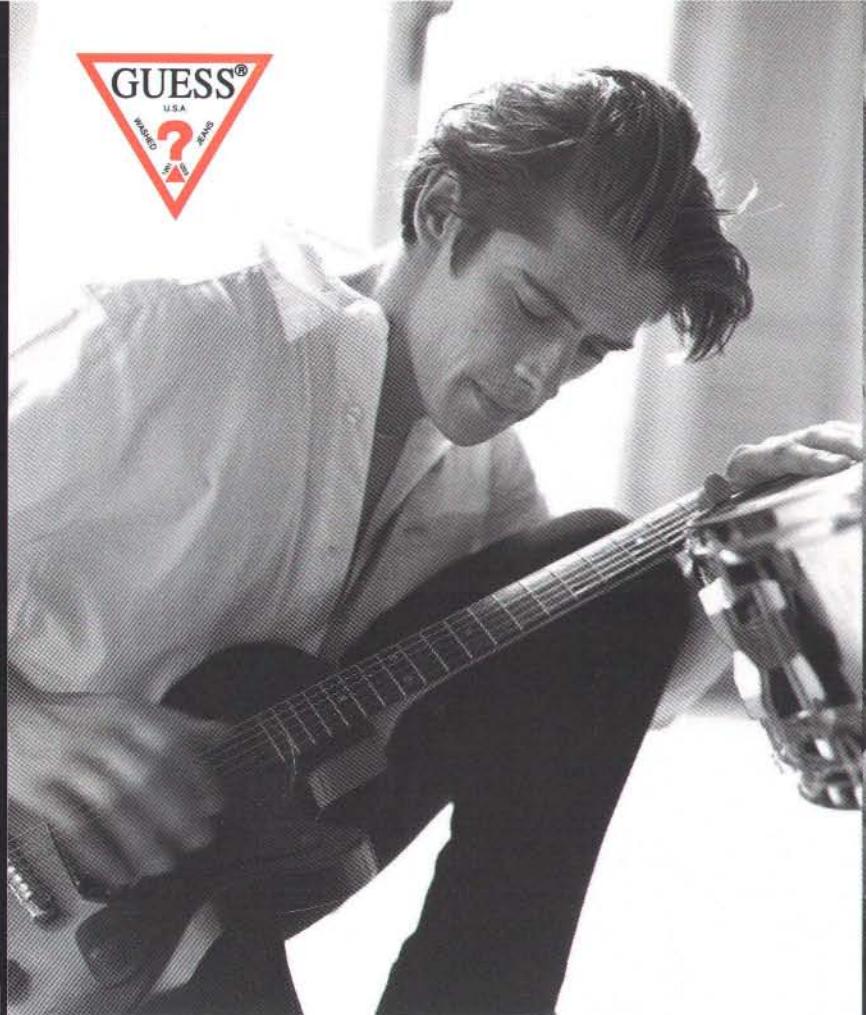
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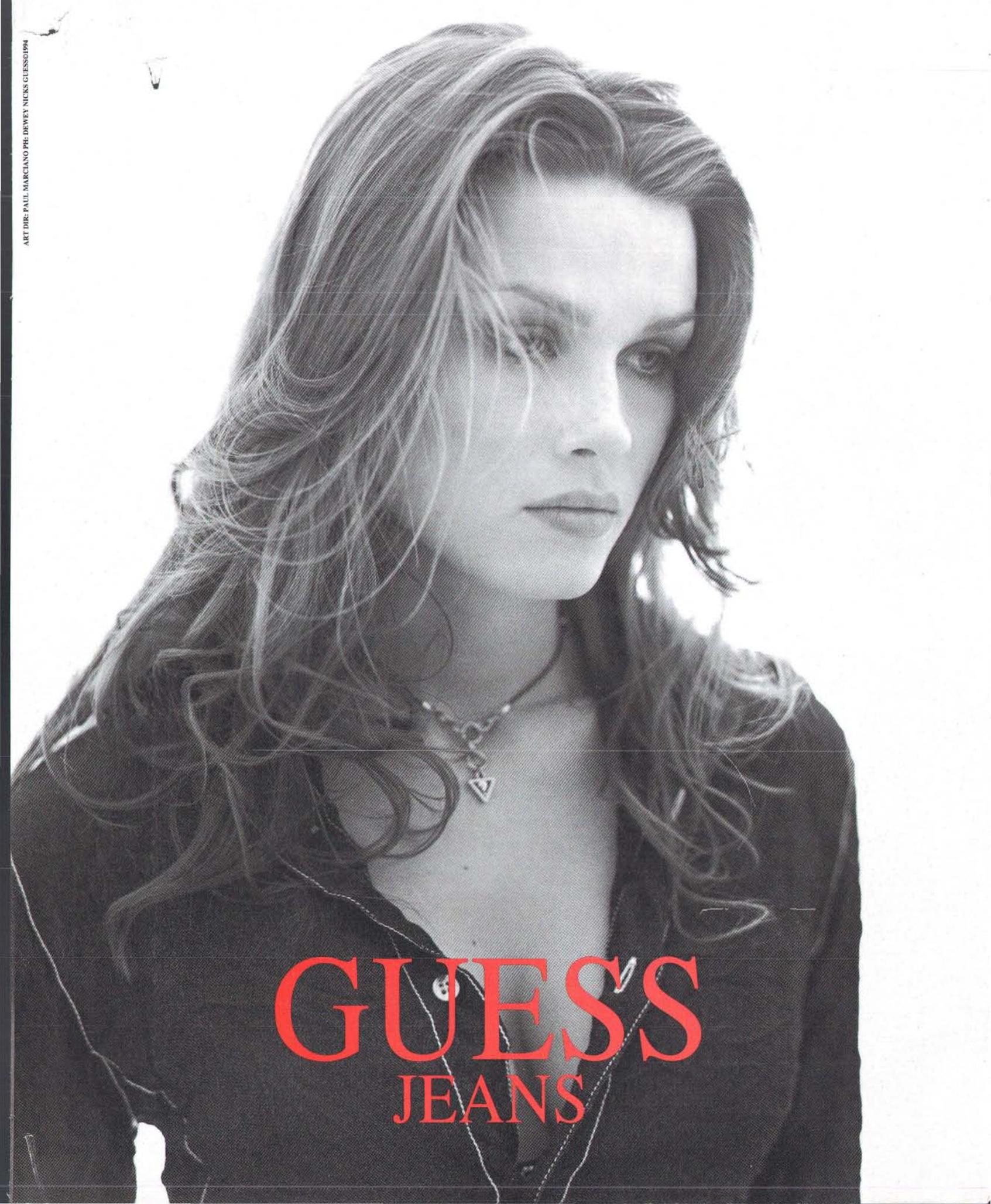
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(Penn Jillette gets wired ▶ page 97)



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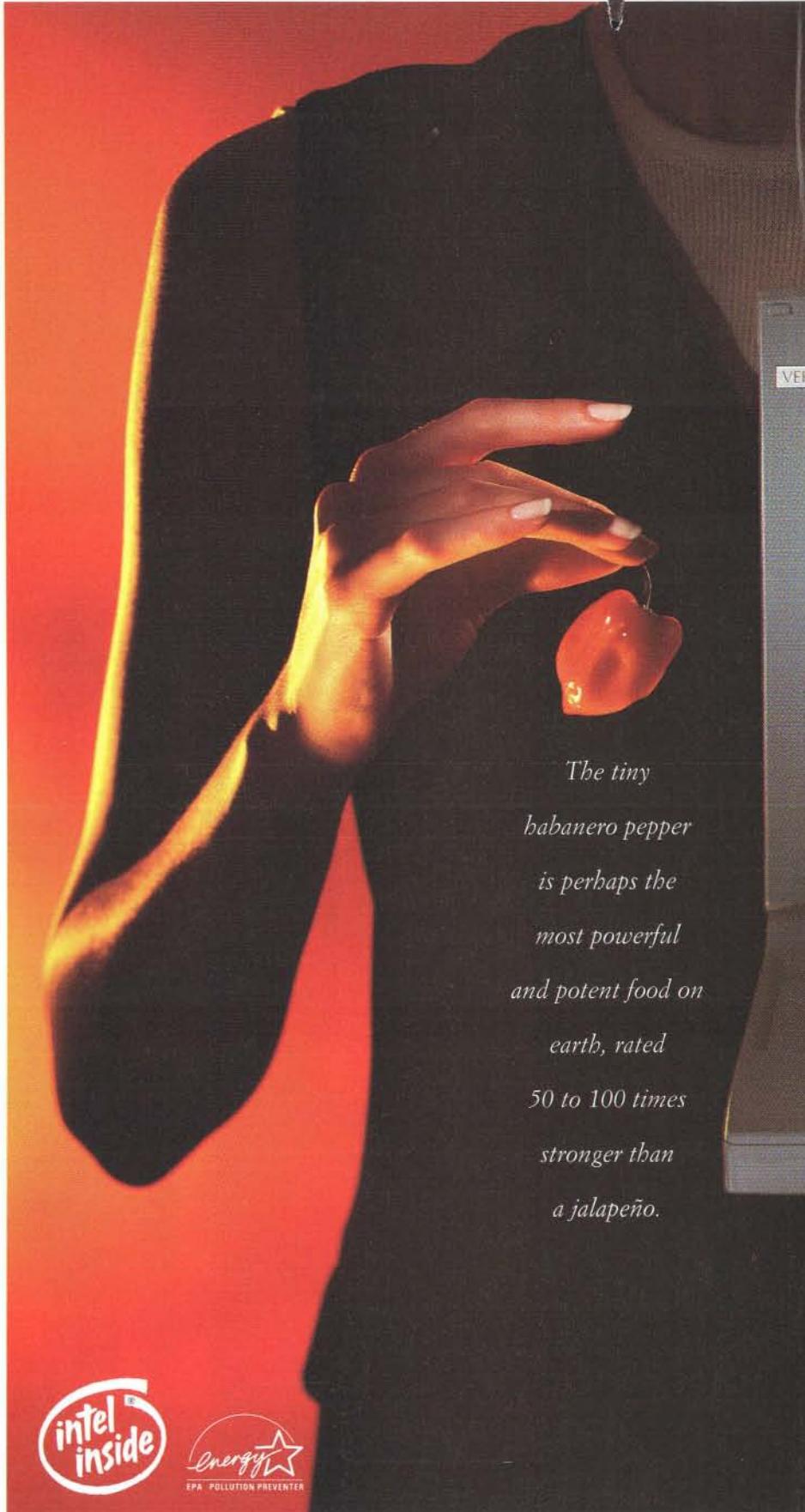
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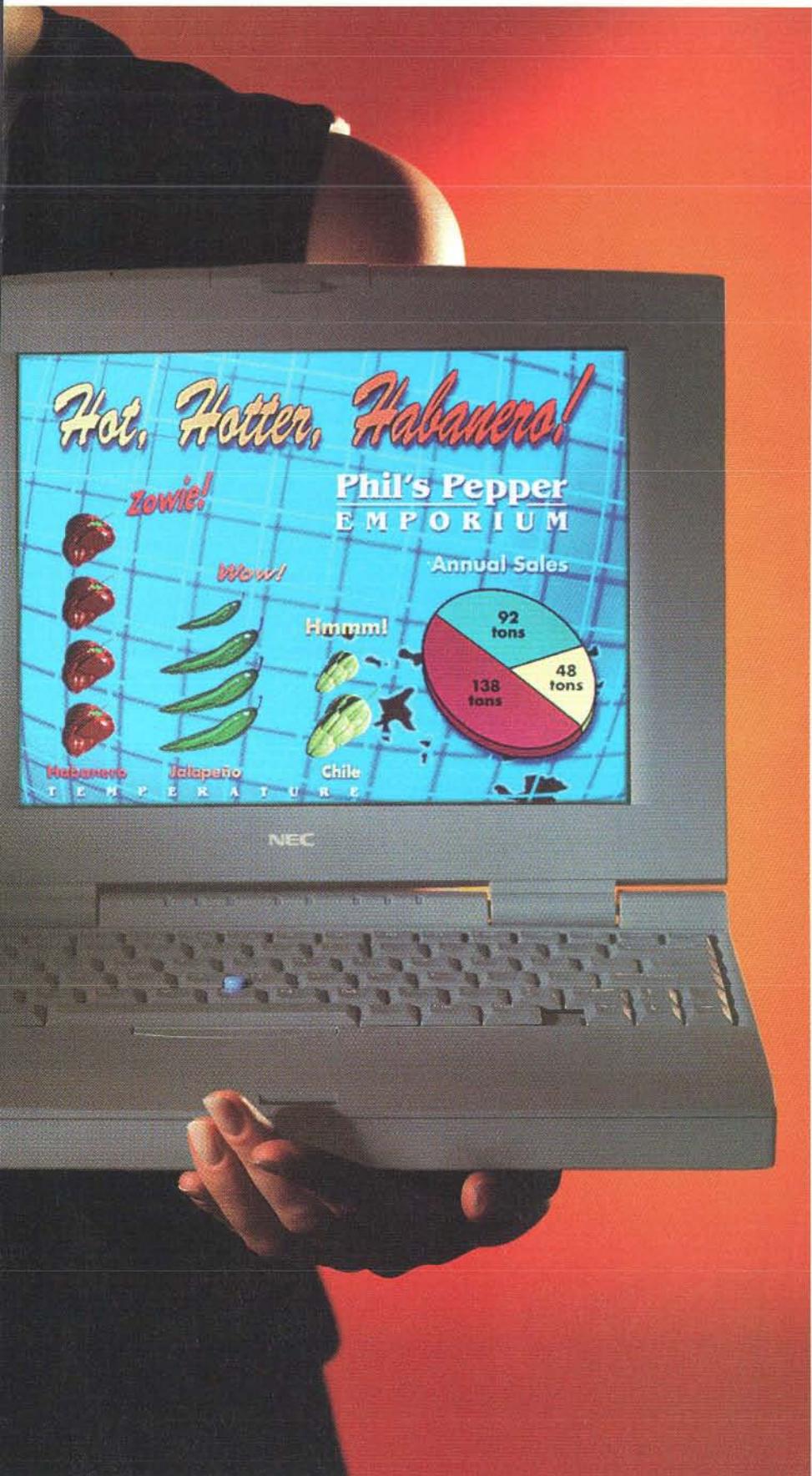
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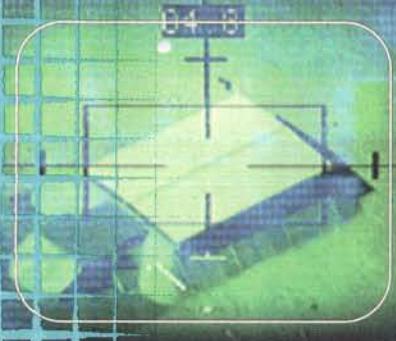
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what happens

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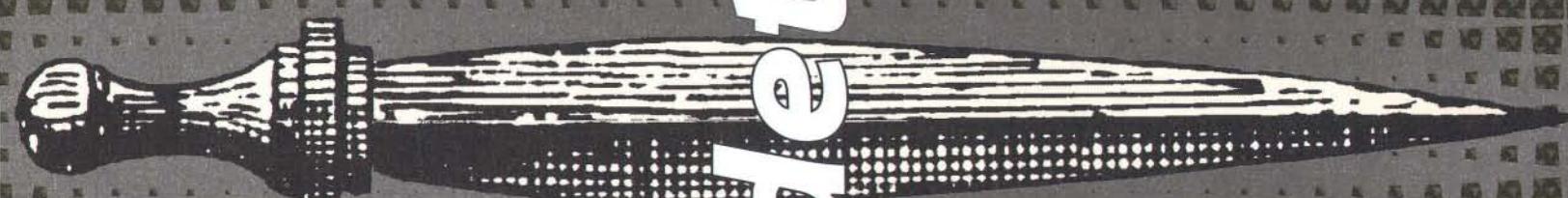
gical exhibitionism, and strategic simulations?



news flash:

cyber-deterrrent

in the 21st century army you get the



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Universal Service

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Genetic Images

When computers breed art and humans direct the flow of fate, startling, alien beauty is born. By Kevin Kelly

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Cyber-Deterrence

What happens when you combine media voyeurism, technological exhibitionism, and strategic simulations? *Wired* visits the digital battlefield of Desert Hammer VI and the Advanced Warfighting Experiment (AWE) to see whether the US Army can win the next war without firing another shot. By James Der Derian

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It's in the can. It has very nice special effects. You'll never see it. By Sheila Muto

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Me-Too Is Not My Style

In making Acer a global computer brand currently growing at 70 percent a year, the Clone King of PC Island, Stan Shih, has become a national hero in Taiwan and the most successful information technology entrepreneur in Asia. By Bob Johnstone

Cover: Penn Jillette photographed by Jim Porto, July 1994, New York.

Introduction: Erik Adigard, M.A.D.

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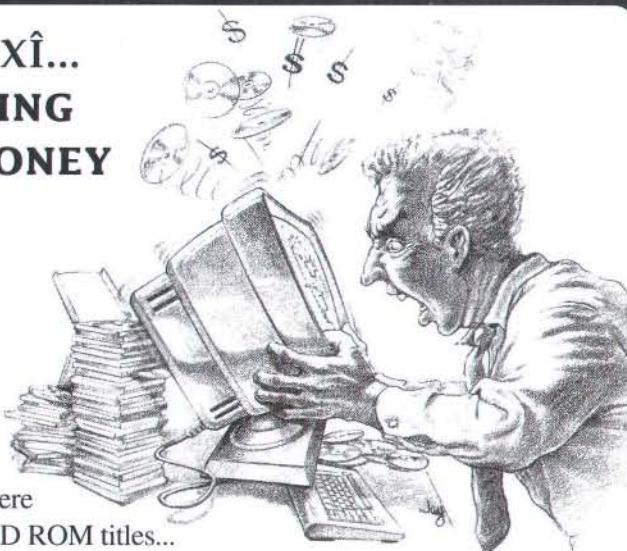
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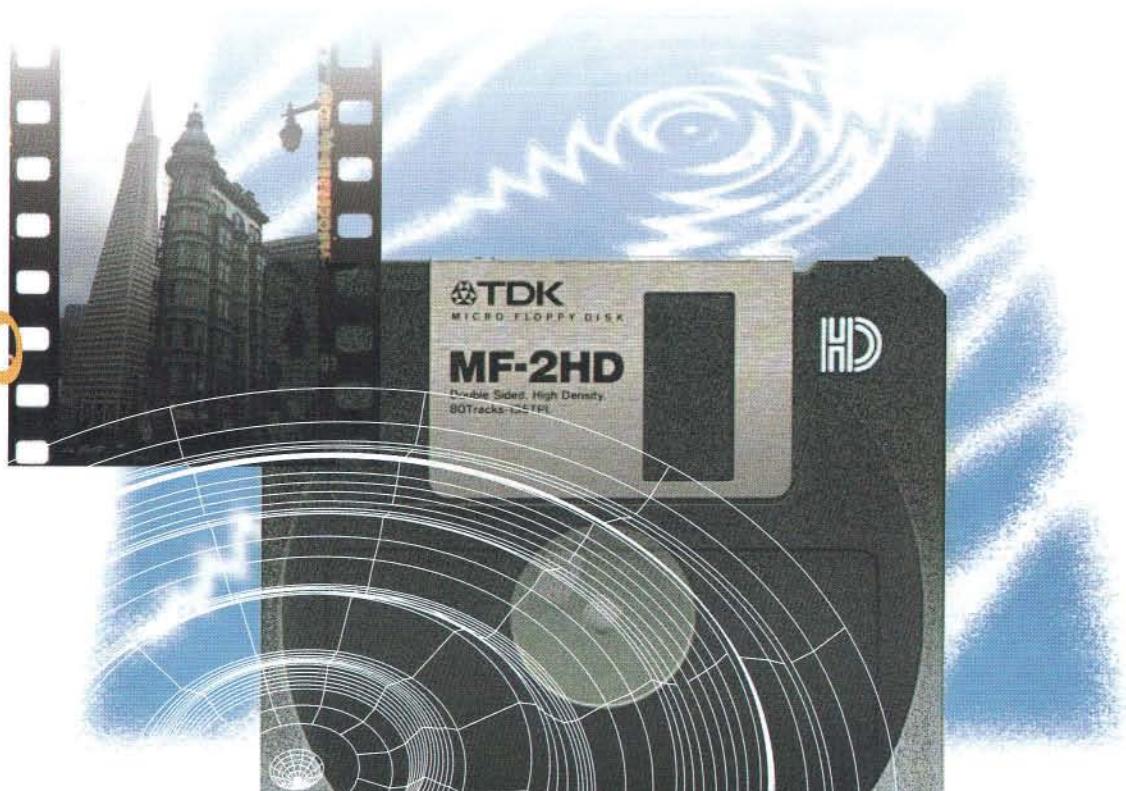
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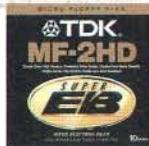
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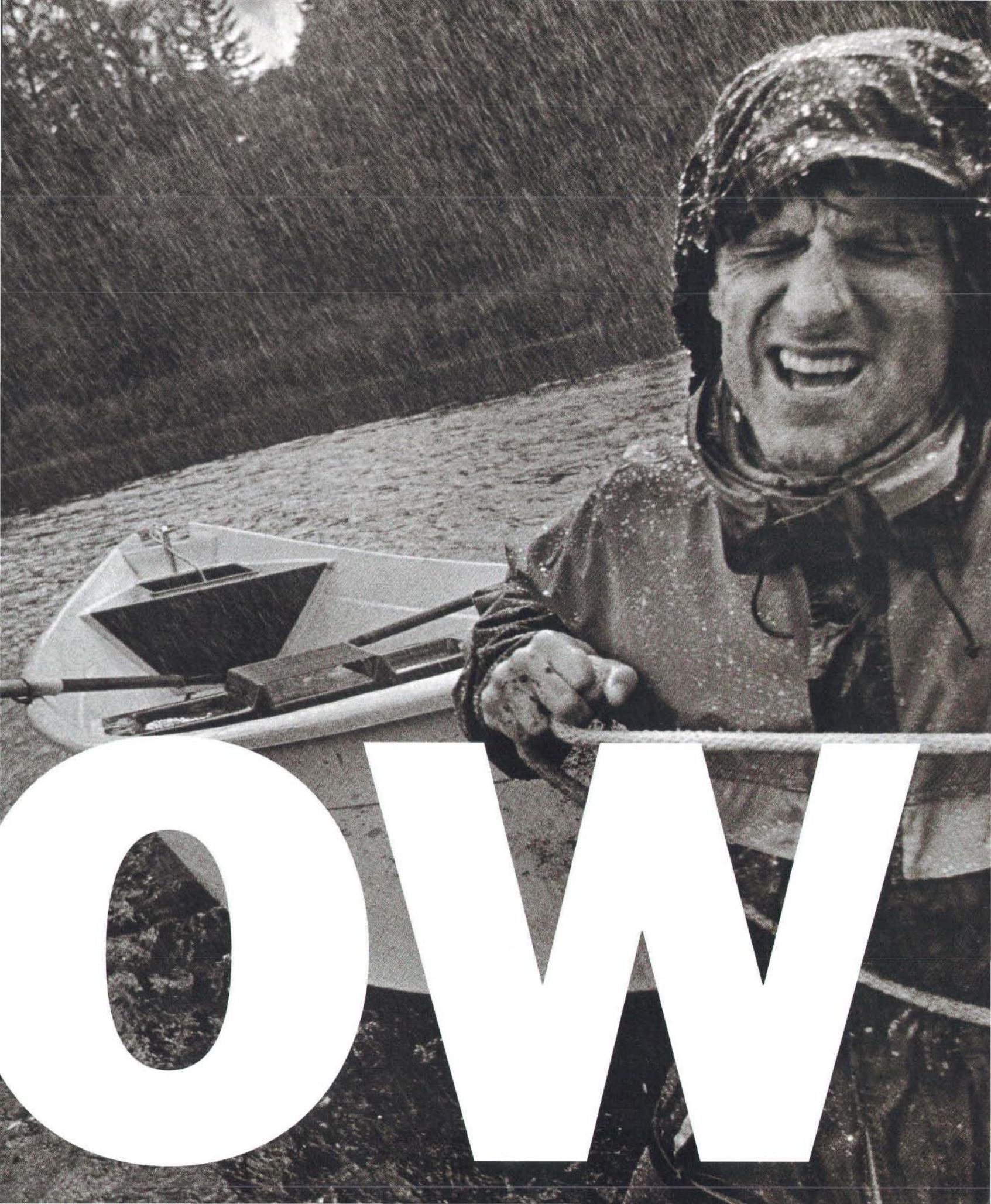
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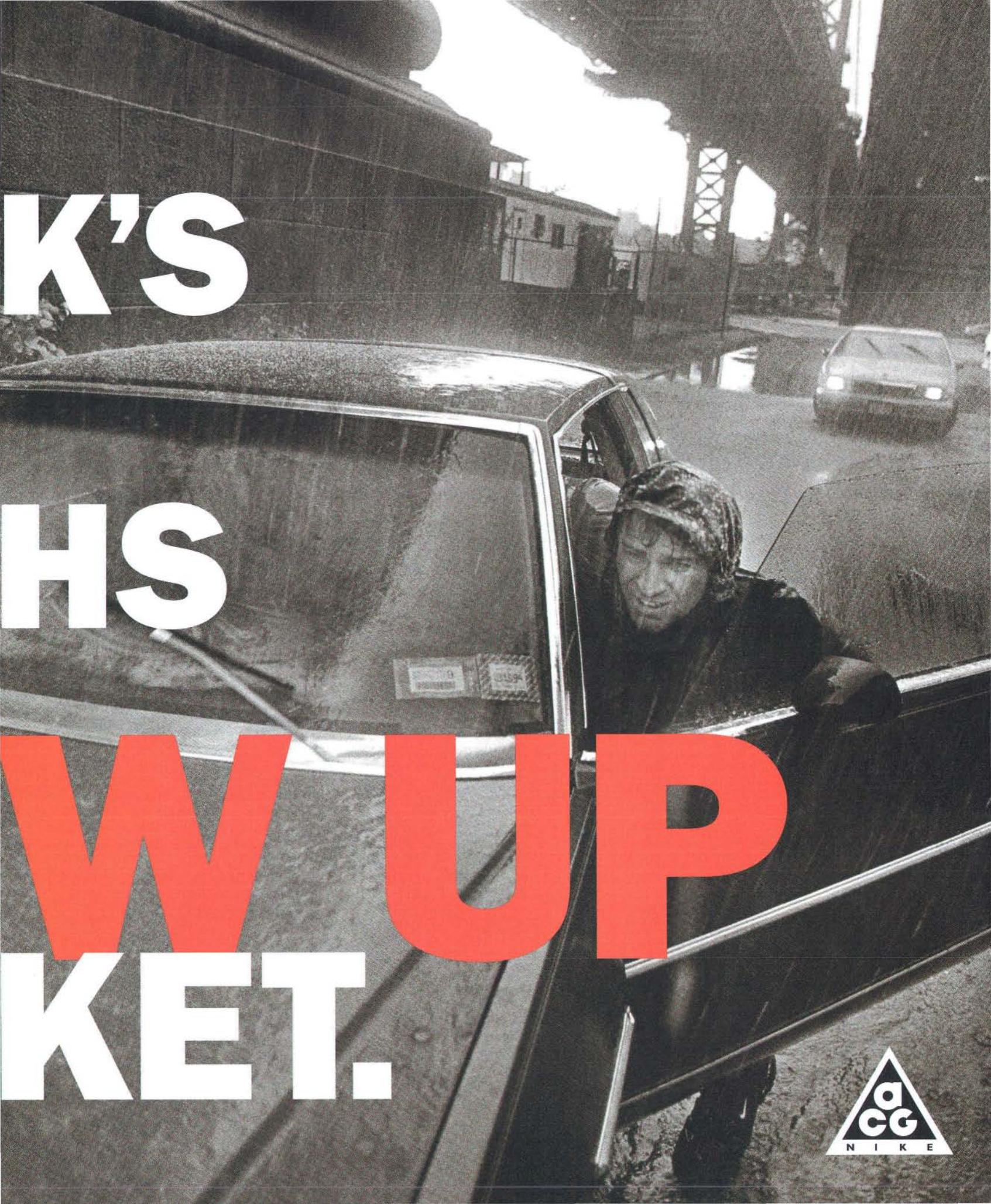
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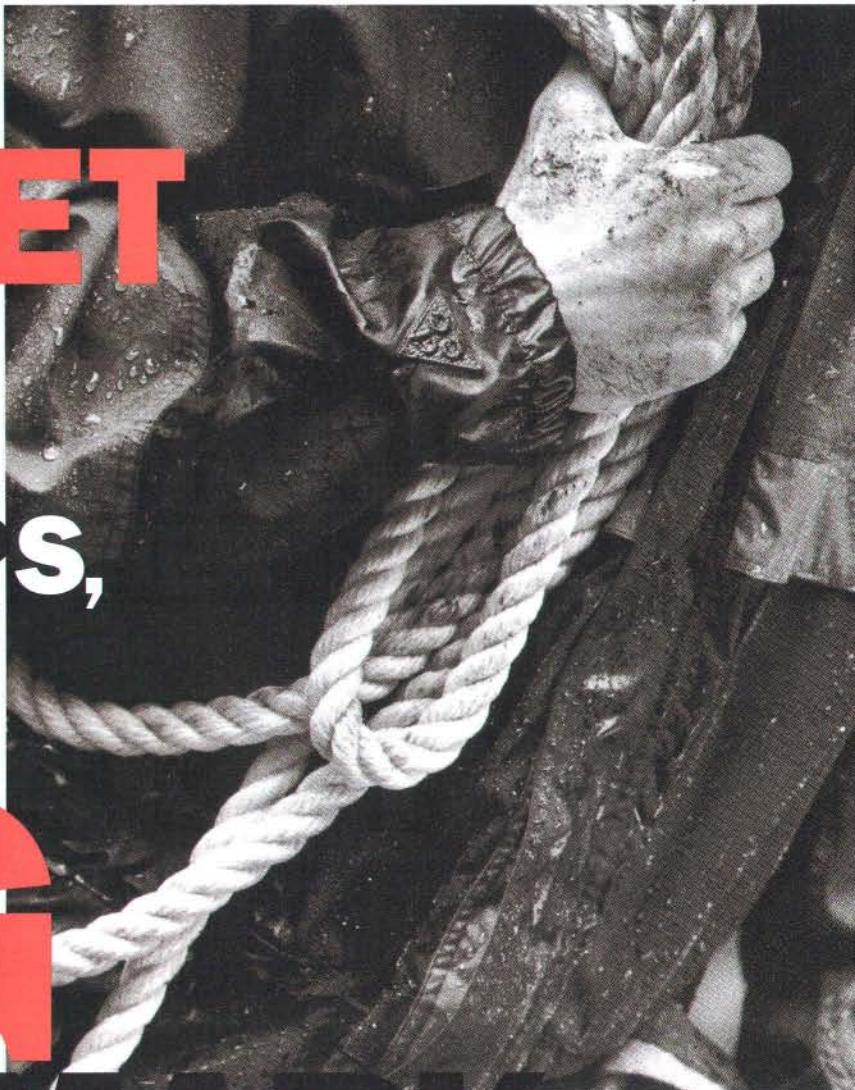
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Rants & Raves

Out of Africa

Jeff Greenwald provides an accurate, colorful description of Africa's need for communication (*Wired* 2.06, "Wiring Africa," page 60). His closing line, about assigning priority to an electronic mailbox over feeding the hungry, reflects a revolutionary change that calls up a bitter history of wasted money, time, energy, and, above all, hopes for the Pan African News Agency.

PANA was thoroughly politicized. Only government communiqués could flow over its wires. Interestingly, African editors, aware of the self-serving nature of the daily flow, used little of PANA's output.

African journalists, for the first time, called for free and diverse news – in the presence of ministers of information. Many African states signed on. PANA would be a continental communication link. If successful, it would be tied journalistically as well as electronically to the global news flow.

Real change will take more than wiring. Most important is political will. Decade-long political debates over wiring were founded on most African leaders' argument that their countries were too poor for better communication systems: give us bread and industry before the democratizing aspects of mass communication, they would say. As a consequence, their nations have neither adequate communication nor bread.

I have long argued that all are needed simultaneously: social and political development and the communications systems that empower them. Political will!

Leonard R. Sussman
freehous@igc.org

Boxes Don't Make Art, People Do

Why is it that so many butchers, bakers, and yes, computer hackers imagine that all you need is a computer to become a video pro? As a colleague of mine once remarked, "Anyone with a camera and a business card is a video professional."

Sure the Video Toaster (*Wired* 2.05, "Flying Toasters," page 60) is a great tool. It has fabulous applications. But boxes don't make great video. People make great video. Somehow in the rush for simple (and cheap) technology, this basic tenet was lost.

In my business, for every talented Toaster user I meet, I suffer through nine vidiots. And the sad part is,

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these vidiots often finagle contracts that should go to more experienced, more talented people. The average video-virgin corporate communications client, not knowing any better, will contract a job to a Post Toastie using Hi-8 rather than a talented producer shooting and editing on Betacam.

But you can bet that the producer working in Betacam knows how to conceptualize ideas, knows how to script, knows how to compose a shot, and knows her way around an edit suite better than 90 percent of the Post Toasties. The bottom line is, the



"Even my 94-year-old grandmother enjoys reading my *Wired* when it comes in the snail-mail box." – Richard Messenger, Claremont, California

talented, experienced producer will deliver a better product: a video with a powerful, hard-hitting message that communicates.

Give me a Les Paul, but I won't be an Eric Clapton. Give me a bat, but I won't be a Ken Griffey Junior. Give me a Video Toaster, but I won't be a Steven Spielberg. Richard Wieser Seattle, Washington

To Clip or Not to Clip

The concern I have about the Clipper encryption scheme that the National Security Agency's Stewart A. Baker utterly fails to address (*Wired* 2.06, "Don't Worry Be Happy," page 100) is that Clipper relies, in part, for its security on the secrecy of its algorithm. Ask any non-NSA cryptographer, and he or she will tell you that any algorithm hiding something must have something to hide. Whether it's a backdoor for NSA's own

use or some weakness NSA could not eliminate, someone somewhere sometime will exploit it.

Pete Gontier
gurgle@netcom.com

Kudos to *Wired* for giving Stewart A. Baker an opportunity to tell his side of the Clipper story. Too bad he didn't have anything valuable to say. Mr. Baker, let me help you understand the one problem that you didn't address: we don't trust you. Why? Because you've never given us reason to. (Remember the raid on

Steve Jackson games, the ATF follies, Iran-contra, BCCI, etc.?) Secure encryption, like firearms, represents an insurance policy for all citizens against future tyrants. I'll keep my copy of PGP, my Mini-14, and, yes, my pocket protector, thank you very much. Like the song says, folks, you can't trust freedom when it's not in your hands.

Scott "Wiseguy" Giordano
squaliardo@scuacc.scu.edu

Go Go Speed Racer!

Why on earth would Richard Kadrey have selected this particular feature to introduce your readers to the world of Japanese animation ("Urotsukidōji: Legend of the Overfiend," *Wired* 2.06, page 109)? Phrases like "... the violence-and-libido-heavy world of manga..." belong in the tabloids, not in a quality magazine (which I have

always perceived *Wired* to be). Manga (and anime) are no more sex-and-violence filled than the vast array of American fiction – some has it, much does not.

If you are really interested in showing people what Japanese animation has to offer, there are a number of fine people available through *rec.arts.anime* who can point you in the right direction.

Jeff Hildebrand
hildebr@mynet.ca

Mais Non, C'est Admirable

Michael Schrage hysterically attacks the French for their failure to understand the Manifest Destiny of "trash for the lowest common denominator" that is one of America's major exports (*Wired* 2.05, "France's Jerry Lewis Media Policy," page 75). He would make a good PR person for European McDonald's. But I can't help thinking that, hunched over his Big Mac, he secretly

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admires a society where people insist on eating well, where they have economic as well as political rights, where leading intellectuals are on prime-time television rather than gathering dust in underfunded university departments, and where magazines don't borrow headings from another language – Idées Fortes – to suggest that they have content.

Brent Gregston
73252.1314@compuserve.com

Unlike France's intelligentsia, I don't eat Big Macs, I don't admire Jerry Lewis, and I don't feel a central government is obligated to fund my attempts at creativity. Vive la différence! – Michael Schrage

Spittin' Mad

I just half-read the article "Rage" (Wired 2.06, page 102) and found myself totally disgusted. I do not like seeing stories like this in your magazine. I'm an avid *Wired* reader and enjoy finding out about the newest advances in the world of computers, communication, and design. Please don't run anymore of these "human interest/everyman" stories about geek murderers.

Bob M. Thomas
bob_m_thomas@vine.org

The more of this issue (2.06) I read, the more unhappy I am. Issue 2.05 was so much better that it might as well have been another magazine. Maybe you should go back to bimonthly; the quality was infinitely superior. I get a copy at work and a copy at home for my kid, and we've both read every issue cover to cover, until now. I won't be getting a copy for home if you're going to run *National Enquirer* crap like "Rage" and "alt.sex.bondage," and I won't bother to buy a copy for work if future issues continue to be as irrelevant as this one was. Thanks for a dozen great issues; I really enjoyed them while they lasted.

J Williams
jwill@microsoft.com

Mr. Quittner, does the EFF really think that an organization like itself, with foggy ideals and dubious-to-nonexistent claims to represent the Net as a whole, can attempt to set directions for something as wonderfully organic and anarchic as the Net?

Ramanan Raghavendran
ramanan@pip.com

My intention, wide-eyed, childlike, and infatuated though it may have been, was to profile some of the people who founded the EFF. I had fun; I'm sorry if you did not.

I never suggested that the EFF claims to represent the Net as a whole. Just the opposite. I think the EFF mines the Net for constituents who understand – as you might – that the "wonderfully organic and anarchic" Net is the best model for what the federal government is trying to build in the name of the National Information Infrastructure. – Joshua Quittner

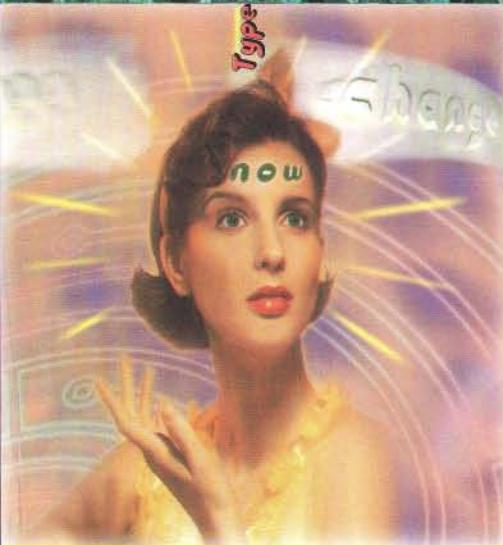
As a former member of the EFF, I am a believer in what the EFF is fighting for; but, having graduated from college into a low-paying job, I found I could no longer afford EFF's normal membership price. I shared the skepticism with many others when the EFF left its Cambridge offices for DC, but I have been impressed at their orchestrated campaign against Clipper and other legislative issues. But the level of decadence described in Quittner's article, as the EFF board members gathered in one of San Francisco's most expensive restaurants and ordered pricey food they barely touched, seemed dangerously close to the type of waste we see coming from members of the US government. The giddy excitement of EFF board members over mentions on C-SPAN and riding on Air Force Two were almost nauseating.

The government is full of politicians trying to become millionaires, and the EFF board is full of millionaires trying to become politicians.

Bill Jackson
Boston, Massachusetts

It is one thing to alert a nation to a serious problem, but it is another thing to be able to steer someone toward the solution. *Wired* has failed in that respect. You have successfully hyped everyone about the dangers of our losing the right to privacy in electronic communication, yet you have, again, done zero to let us know specifically what we can do as readers to help combat the problems that you are always identifying. I don't want to be just a member of the EFF. I want to be able to take direct action, so I may help prevent an epidemic.

I called my congressional representative to tell him that I was against the Clipper Chip, and that I was a proponent of the right to privacy in electronic communications. I was saddened to get a response from him asking me to which piece of legislation I was referring, so he could do more research. When I consulted the



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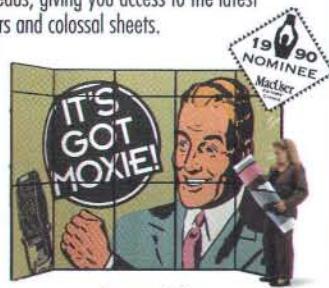


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RANTS & RAVES

appropriate issue of *Wired*, I could find nothing but general information and was unable to give the congressman anything to go on. No specific legislation is mentioned. To this day, I have been able to find no information about any impending legislation before the US House of Representatives.

To the editors, please get off your ego-asses, quit reveling in your newfound fame in the publishing world, and take some responsibility in following through with the issues you are inflaming the electronic community with. Telling us about the problem is not enough! You need to offer suggestions as to how someone can solve these problems.

If I hear the name "Mitch Kapor" one more time I'm gonna puke! Please become more specific, and do some *real* research from now on.... At least the legal counsel for the NSA was being specific. (Also, no more letters praising how good you are.... We know, we know! *Really*, we do. Details, details, details!)

Patrick Mannion
72614.1411@compuserve.com

First of all, Clipper is not a legislative proposal. Second, let us assure you that we're giving this grave issue the detailed coverage it so needs and deserves. Please refer to pages 48 and 49 of *Wired*'s April issue (2.04): there, under the headline "What Can You Do," we've laid out specific action you can take to fight Clipper. If you still crave more, please contact HotWired or the Info-rama (info-rama@wired.com) to access our Clipper archive. —The Editors

Where Are the Women?

Here's a riddle:

We are online in droves. We develop software, shoot video and edit on nonlinear systems, create interactive discs, host online services, read *Wired*, and even work on cyber-magazine editorial staffs. But we are not in *Wired* magazine. Who are we?

Women, of course.

C'mon guys. Each time I read the cyber-publication of my time, I'm amazed that it reads as though published 20 years ago.

Don't stop doing what you're doing, don't freak out about the PC police, just add more. Add me, and maybe I and all of my other techno-girlfriends will subscribe.

Videogrrrl

Videogrrrl@aol.com

Shock Value?

As a new subscriber to *Wired*, I am having great difficulty coming to terms with the difference between your editorial copy (thoughtful, amusing, provocative) and some of your advertising (violent, sexist, sick, offensive).

I don't know whether *Wired* has an advertising code. If you do, I don't think it's strong enough. If you don't, I think you should adopt one. At a mini-

mum the code should prohibit advertising that 1) glorifies or encourages violence and/or 2) exploits or demeans women.

Terry Lavender
Toronto

Zilchies

Oh dear, oh dear. Poor Jules Marshall must have been having a blonde day when he wrote "Zippies" (*Wired* 2.05, page 79).

Plunk yourself down in the center of Glasgow, Liverpool, Manchester, Birmingham, Bristol, London, or even the Isle of Wight and you'll find New Age travelers and ravers who have resorted to their lifestyles because they cannot get housing, aid, training, or jobs. They've been let down and tossed aside by a government that thinks it's still 1924. Yes! Drugs and raves are fun! But "pronoia?" Get real. Things are truly bad here, and due to get worse.

If there is a zippie movement coming from over here, it stems from the attitude that people have *zip*, with *zip* to look forward to, and must deal with a government that has *zip* for brains. Sorry, Jules.

Chey Cobb
10004.3342@compuserve.com

Attention Deficit Di... What?

The item on Attention Deficit Disorder ("Interrupt-Driven," *Wired* 2.06, page 46) was illuminating. At least the first part of it was. I flipped over to Net Surf before I finished, but I plan to get back and finish the rest as soon as I can....

Tom Dale Keever
keeve@phantom.com

Undo

► We made a glaring error on the cover of the June issue: instead of reading "Get Wired," the Morse Code we printed incorrectly declared "Geo Wired." ••• • /

••• — — — ••• • ••• ► A few errors appeared in the EFF piece we ran in the June issue ("The Merry Pranksters Go to Washington," page 77): First of all, EFF moved to Washington in January of 1993. Also, Stewart Brand never raced the psychedelic bus (he was simply on a bus that was racing, and it occurred near Taos). The Trips Festival was in fact the first and only of its kind. And Brand's office is technically a fish boat, not a shrimp boat. ► The Sun Voyager (Fetish, *Wired* 2.06, page 35) is actually not the first fully transportable SPARC workstation. SPARC laptops have existed for more than a year. ► We forgot the credit for the cool image of Juan Atkins on page 97 — Lisa Spindler took the photos. ► The photograph on pages 102-103 was taken by Henrik Kam.

Send your Rants & Raves to:

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Create your character and visit *Legends of Future Past*, a world created through artistic prose and colored by shared imagination. Meet the exciting, intrepid and interesting people who populate these ever-expanding lands. Become part of the community of adventurers who have found reward, riches — even love — in the fantastic land of the Shattered Realms. Learn why *Computer Game Review* said of *Legends*, "No other game... captures the true essence of roleplaying like this one."

Another NovaLink favorite is the *Virtual Cafe*. It may be the only cyberspace social center where you can play trivia while sipping wine in a snowbound hot-tub. Drop by for a romantic rendezvous, or play the slots to win big virtual bucks.

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fast-paced action, join the ranks of the *Cyber Corps* — the first multimedia online action game of its kind. Form teams with other players from around the world and race against the clock, navigating a maze of alien corridors, mutants and traps to be the one who can garner the galaxy's most precious substance...

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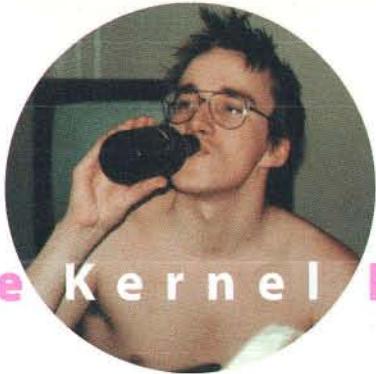
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The Kernel Kid E

Linux, a full-featured Unix clone, will turn your PC into a workstation – for free. Started as a do-it-yourself project in 1990 by 20-year-old Finnish college student Linus Torvalds, Linux has grown into a mature operating system, co-developed by volunteers from every corner of the online world.

Unsatisfied with Minix, an earlier version of Unix for DOS, Linus taught himself all about 32-bit protected mode (the key to implementing a multi-tasking OS on the 386) and, after a six-month hacking session, distributed the source code for Linux Release 0.01 to 10 or so troubled souls who had expressed interest over the Net. It's doubtful more than one or two of them were sensible enough to actually compile it.

Subsequent versions, however, attracted the attention of hundreds, maybe thousands, of programmers who formed themselves into an ad hoc development team, taking on tasks as ability and interest (and sometimes Linus) dictated. At present, Linus primarily coordinates work on successive versions of the kernel, and estimates that he authored less than half the code in the official 1.0 kernel, which was released by the development team in March 1994. Matt Welsh, coordinator of the Linux Documentation Project, estimates that third-party companies have sold over 10,000 CD-ROMs containing Linux and related documentation, and that thousands of people have downloaded Linux from ftp sites. Several companies voluntarily donate a portion of their sales to Linus, according to Welsh.

Linux supports an enormous collection of high-quality free software including TCP/IP, Emacs, C and C++ compilers, The X Window System, and, for the timid, an MS-DOS emulator. For starters, check out the book *Linux Installation and Getting Started* (available at sunsite.unc.edu, along with Linux itself).

So, is Linus going to become the Bill Gates of Finland? Maybe not. He claims to be "by no means a good student" and is in no hurry to graduate since "Linux has taken a lot of time from my studies, and I like the work I have at the University which keeps me alive."

For photos of Linus downing a few cold ones after the successful release of 1.0, go to WWW address: <http://sunsite.unc.edu/mdw/linux.html>. Linus: torvalds@cs.helsinki.fi. – Seth Rosenthal



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How

Reagan Got AIDS

When Benetton's *Colors* magazine ran a series of rasterbated photographs portraying Arnold Schwarzenegger as an African American and Spike Lee as a Jewish kid from Brooklyn, the results drew more guffaws than gasps.

But when Benetton asked Site One New York – the digital imaging studio that produced the race-erasing illustrations – to give former President Ronald Reagan AIDS, nobody laughed.

"It wasn't a pleasing job. I wouldn't wish giving AIDS to anybody, but it sure was an interesting project," said Site One artist Tony Spengler, who, along with Kathy Grove and Mary Reiley, created the gaunt, sore-covered image of Reagan for *Colors*'s June issue.

Starting with a full-color photograph of a healthy, rouge-cheeked Reagan, Spengler and his partners altered the appearance of the former president's head by "removing portions of the neck and exaggerating the features that were already there" to make Reagan appear emaciated. Using photographs of Kaposi's sarcoma lesions as reference, the artists dotted Reagan's face and neck with red sores. "Only a couple of lesions are real; the rest are illustrations," said Spengler.

The finished image, shown here, was run in *Colors* alongside a sardonic mock obituary eulogizing the former President for "his quick and decisive response to the AIDS epidemic early in his presidency" and for "averting what could have been a global catastrophe costing millions of lives." Site One New York: +1 (212) 447 1517, *Colors*: +39 (6) 6880 4050, e-mail: 70214.2344@compuserve.com. – Mark Frauenfelder

H-Gun is Media for Media



In 1989, while attending the School of Art Institute in Chicago, Ben Stokes and Eric Koziol formed H-Gun Labs to produce adrenaline-fueled music videos for the swelling ranks of Chicago's industrial music scene. With a style that combined dozens of edits per second with non-Euclidean camera angles, H-Gun paved its way into other music genres and fatter budgets, all the while skirting the edge of

MTV's content guidelines.

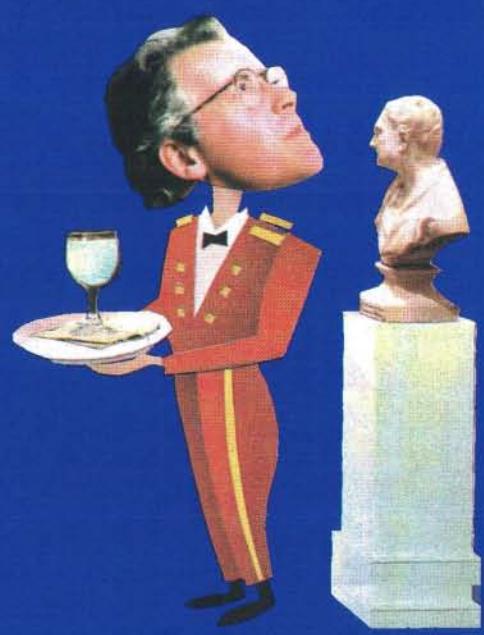
Five years and around 100 videos later, the team is aiming its gun at other targets: animation, TV shows, and commercials. A Cartoon Network promotional spot for *Jonny Quest* was accompanied by a funkified-up theme song that had little to do with Hanna or Barbera. Such flourishes are obviously a result of H-Gun's music-video past. Koziol explains, "Music video

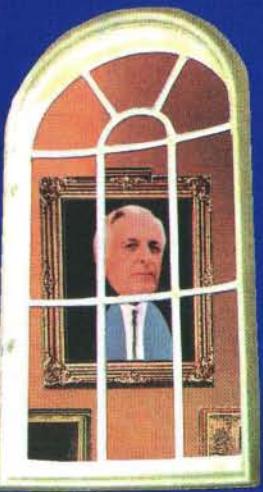
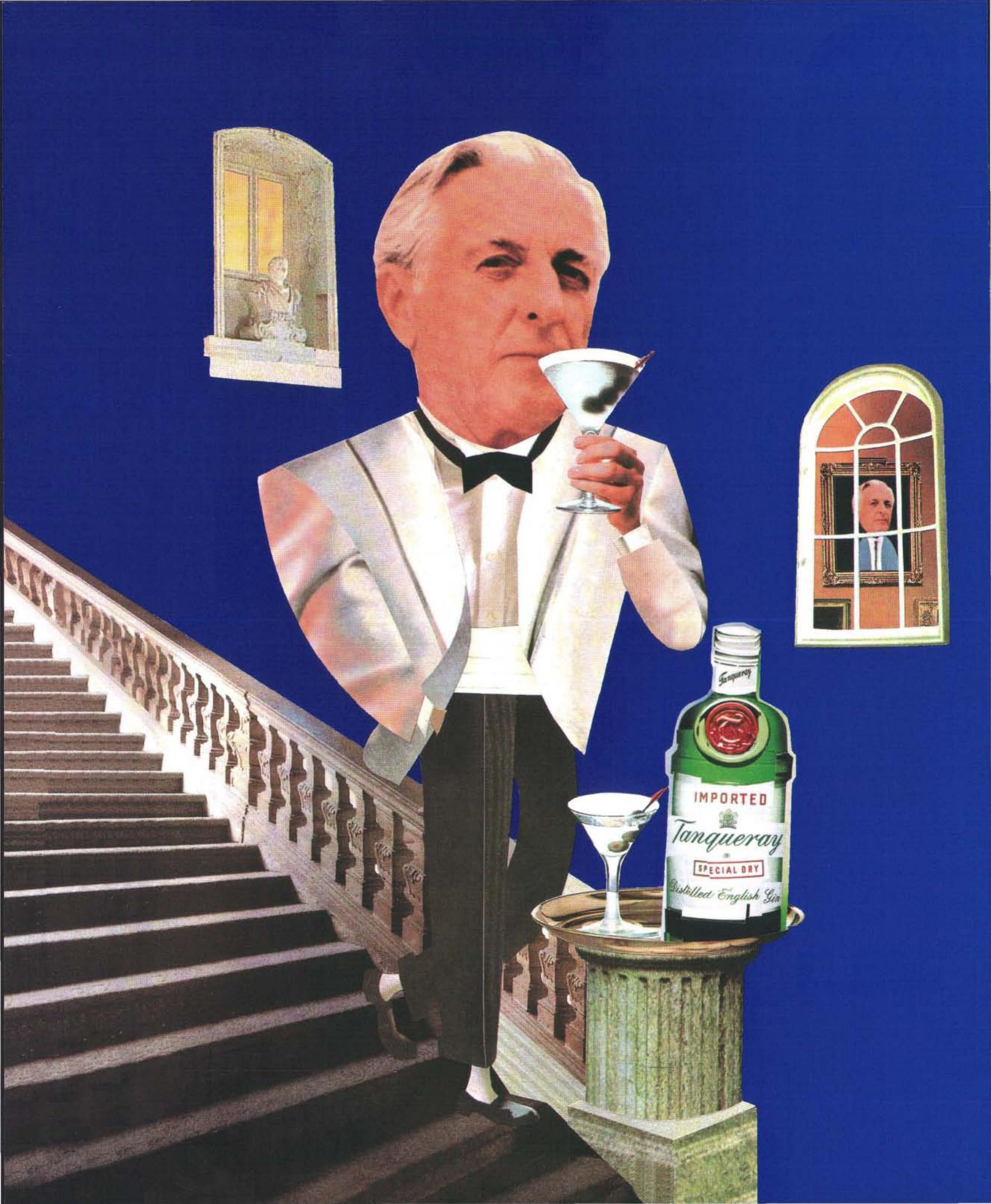
becomes the trial ground for new techniques and looks — viewers tend to become more sophisticated and get bored with a straight take on things."

Toiling away in their 8,000-square-foot "lab," H-Gun has developed a sci-fi TV pilot called *Mad Science*. "It's an alternative to all of the straight science fiction that's on TV now. The technology of *Star Trek* with *Pee Wee's Playhouse*

sensibilities," says Koziol.

Having recently completed TV commercials for Atari Jaguar and Virgin Games, Stokes concludes, "We're slowly making the transition into commercials, but one thing I would note about our commercial work is that it's all for other forms of media ... video games, TV programming, etc. We're media for media." H-Gun Labs: +1 (312) 808 0134. —Dan Sicko (reverbmag@aol.com)



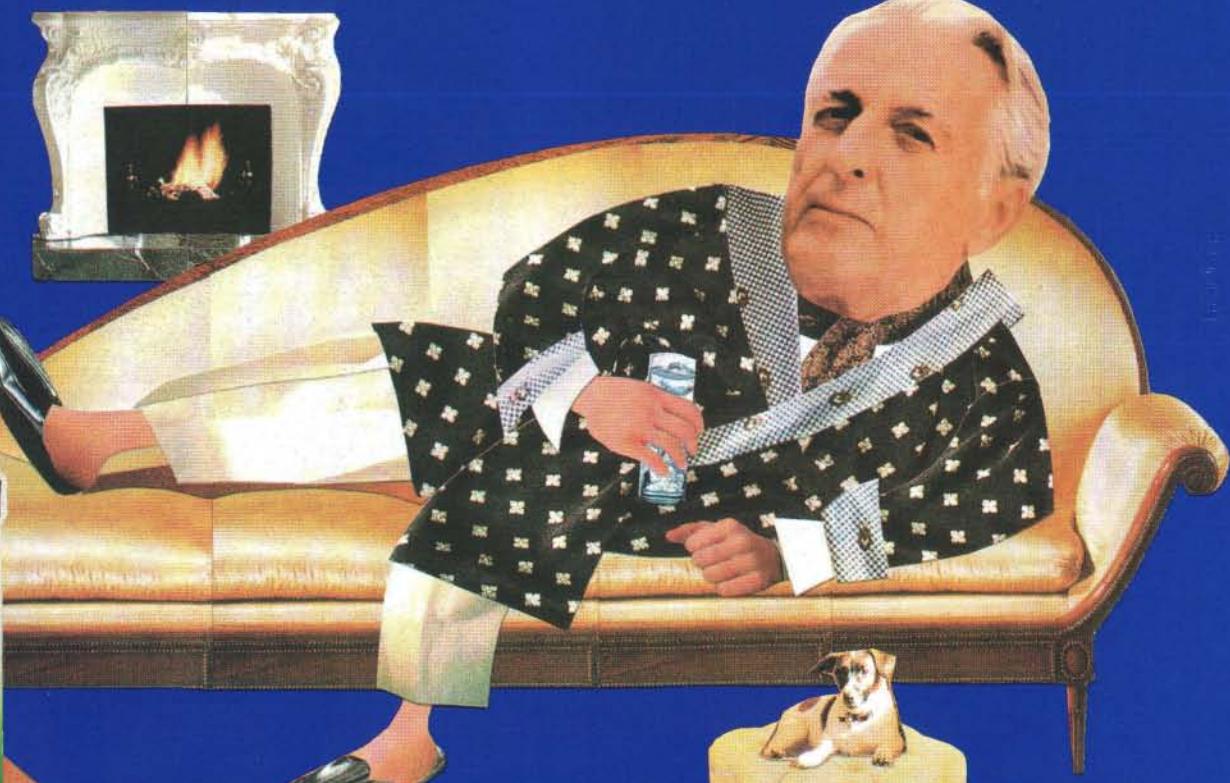


"The applause was deafening when Mr. Jenkins told Stewart, the pianist, that if he didn't end his 'Feelings' medley, he'd find himself wearing Mr. Jenkins' Tanqueray martini."



"Later that evening, Mr. Jenkins
wonders if Stewart's cummerbund
will shrink when it dries out."

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How refreshingly distinctive.



III Nonstop AOL: Not only has AOL surged over the 1 million subscribers mark, but ABC recently announced it will join NBC and CBS

in hosting AOL-based forums. Hmm. Makes you wonder what's really going on. If these three are so committed to online services,

why don't they just build their own and compete with AOL? Are Cap Cities and Barry Diller really that afraid of the looming competition from the likes of Apple (eWorld) and Microsoft (Marvel)? If so, may they rest in peace. III But Someone's Looking: A summary of "responsibilities" for a new vice president of marketing at a major media company recently crossed our desks. "The Vice President,

Marketing will be responsible for developing innovative, creative, and *addictive* content and services that will attract and retain the consumer and professional markets." No, we can't tell you who's looking or what they might start. But they seem to understand the bottom line. III Prodigal NBC: Well, NBC is branching out at least. NBC is collaborating with Prodigy in the launch of America's Talking, NBC's all-talk cable channel. Prodigy will offer live chat areas that will allow viewers, guests, and hosts to communicate live, thus solving the eternal question: PC or TV? NBC's answer: both, preferably in the same room. And, BTW, the press release claims, "America's Talking executives and hosts will respond to every e-mail they receive." There was no e-mail address ►

In the world of product marketing, one formula for success holds true: get there first.

Stratos Product Development Group, a Seattle product design firm, has built itself upon that formula. "A product delayed by even a few months can mean lost market share and initial profits," says Stratos President Allan Stephan. Stratos develops new products in one-half to two-thirds

this point, modifications are easy and inexpensive to make."

An essential second ingredient to Stratos's formula for success is the breadth of its staff. With specialists in every conceivable area of industrial design, the company can put together complete product development teams quickly and with less reliance on outside help. For example, they employ experts in application-specific integrated circuit (ASIC) design to integrate electronic logic into the tiniest possible footprint, resulting in a smaller product, reduced power consumption, and lower manufacturing costs.

Speed may not be everything, but it does make an excellent calling card, especially in an industry where the life of a product can be measured with a ripening banana. Stratos Product Development Group: +1 (206) 448 1388. — Gary Good

F r e a k s

the time that its clients — Microsoft, Apple, Nintendo — estimate it would take their own designers.

Speed and quality are thought by many design houses to be conflicting demands, but Stratos sees them as being inextricably linked. "The same processes that speed prototyping can bring initial design problems to light," says Stephan. "At

P e r s o n a l M o v i e

Unlike millions of moviegoers who flock to the cinema each year, people who are deaf or profoundly hearing-impaired often pass on all but foreign films with subtitles — because the dialog escapes them. That may soon change.

During several screenings in March at the Smithsonian's National Air and Space Museum in Washington, DC, about 100 deaf people tested four technologies aimed at providing captions visible only to those who need to see them.

"What everybody would like is some kind of magic invisible captions that only show up when you put on a pair of glasses," says James Hyder, assistant manager of the Air and Space Museum's theater. "Unfortunately, the principles of physics make that impossible."

Of the four prototypes tested — polarized glasses, VFD screens mounted on seat arms, tiny TV screens attached to visors, and a sheet of transparent plexiglass reflecting captions that are project-

ed in reverse from the back of the theater — Hyder says the latter offers the most promise. The plexiglass is mounted on a gooseneck attached to the seat so viewers can adjust it for their own comfort. The system, simply called the "Rear View" device, allows viewers to put the captions wherever they want, at the bottom of the screen, in the middle or to one side, and still watch the movie through the plexiglass. In test screenings, viewers liked the system.

The total installation cost of such a system is currently upwards of US\$10,000 for an average movie theater. Unless that figure dips below about \$3,000, Hyder says most theaters probably won't consider installing it. But the Air and Space Museum is going ahead with plans to install the "Rear View" device, sometime by the end of 1994, making it the first movie theater in the world to offer viewers closed captioning.

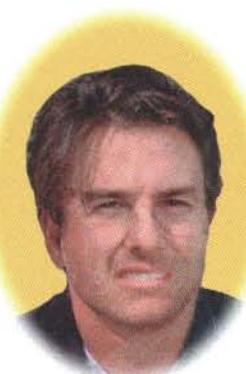
— Betsy Bayha

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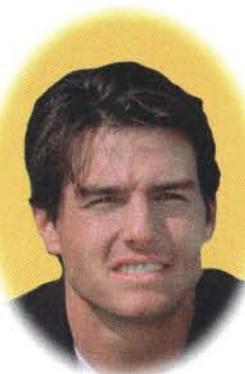




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Digital Cruise Control

"I'm not afraid of the technology," said actor Tom Cruise. "It is important not to restrict the creative aspect of what digital can do and to keep that growing." But like many others attending the first annual International Artists Rights Symposium this summer, Cruise was pushing to revamp the nation's copyright law. He wants to make it difficult for copyright holders to change works without the consent of the artists involved.

After seeing how film from the past can be

transformed and combined with new material — such as making Nixon and JFK say things they never uttered in real life to Tom Hanks in *Forrest Gump* — many actors and directors are eager to protect their work from becoming blended into a holovision commercial for 21st-century Diet Coke. "I don't want anybody else playing the roles I play, and I don't want to play anybody else's roles," said Cruise.

Characterized by one attendee as a "digital housebreaking session," many participants

seemed eager to make computer artists the scapegoats. But Steven Spielberg, whose *Jurassic Park* stampeded to success on the strength of its digital dinosaurs, jumped in to protect the special-effects pixel pros, proclaiming, "Those so-called nerds who operate the computers, they're absolutely artists!" He sided with Cruise by claiming the real issue was about not allowing *"A Few Good Men"* to be turned into *"A Few Good Women"*, unless it's a result of the director, Rob Reiner's choice. — Paula Parisi

► on the press release. **III** Game Wars: Given their divergent corporate cultures, we thought the Sega/Microsoft alliance for gaming

OSes was weird, but given the competitive alliances now shaping up, it all makes sense. Microsoft recently bought high-end SGI

software shop SoftImage, so it doesn't take a, er, Rocket Scientist to see that SoftImage's 3-D wizardry will end up in future Sega

game machines. Meanwhile, SoftImage's archrival in the high-end graphics field is none other than SGI software shop Alias

Research, who this summer announced a strategic alliance with ... you guessed it: Nintendo. **III** Kodak Clicks on Sculley: You may

have missed it, but John Sculley, whose legendary fallout with both Apple and Spectrum Information Technologies Inc. should keep biographers busy for a few years, is now a quarter-time consultant to Kodak for its digital-imaging and brand-marketing strategies.

Look for a complete rundown on Kodak in these pages a few issues hence. **III** Old Engineers Never Die, They Just Stop Being

Upgraded: The 1994 IEEE (Institute of Electrical and Electronics Engineers) Member Opinion Survey turned up this thread: older ►

J A R G O N W A T C H

Bitnik — One who uses a coin-operated computer terminal installed in a coffee house to log into cyberspace.

Cybrarian — One who makes a living doing online research and information retrieval. Also known as a "data surfer" or a "super searcher."

Delurking — Coming out of online "lurking mode," usually motivated by an irresistible need to flame about something. "I just

had to delurk and add my two cents to that conversation about the Singapore caning."

Designosaurs — A species, nearing extinction, of designers who refuse to use computers.

E-purse (for "electronic purse") — An electronic monetary transaction card being proposed by several government agencies.

Glueware — The trend of tying software applications

to physical networks through the AT&T system. Used in reference to a deal AT&T and Novell have struck to adapt Novell local area networking software to communicate over AT&T's long-distance network. Intel and Microsoft are considering similar arrangements, according to *The Wall Street Journal*.

NRN (or "No Response Necessary") — A proposed e-mail convention to prevent

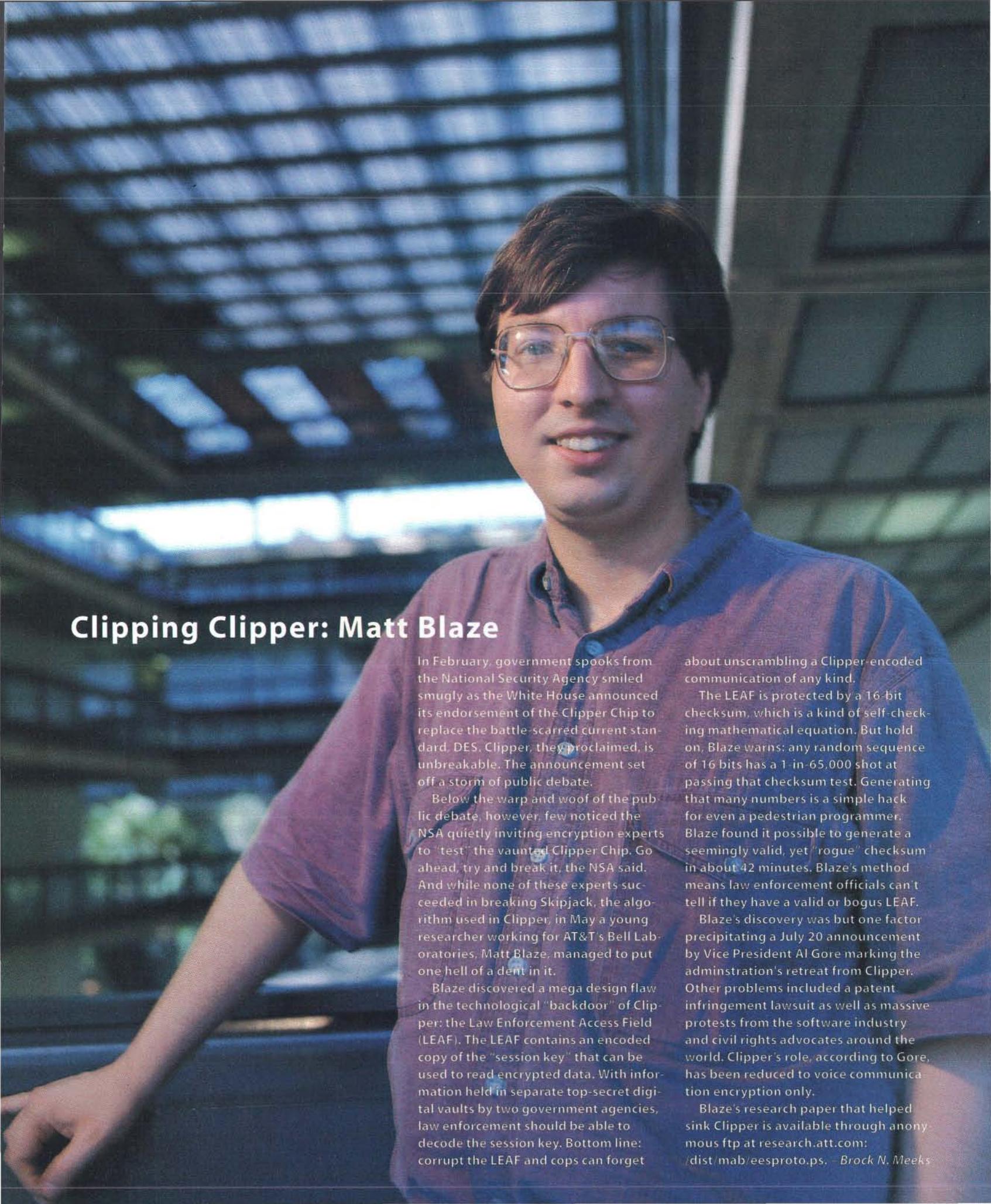
endless back-and-forth acknowledgments: "Thanks for the info." "You're welcome ... hope it helps." "I hope so too. Thanks." By putting NRN at the bottom of your mail, you absolve the receiver from having to reply, thus saving precious e-mail time.

Time Porn — Popular entertainment, such as TV shows like *Cheers*, *Seinfeld*, and *Mad About You*, where people never seem to have anything to do except hang out. They tease us with the

forbidden leisure time we all covet but can't have. Used in an article by Colin McEnroe in the *Hartford Courant*.

Webmaster — The name given to the person in charge of administrating a World Wide Web site. — Gareth Branwyn

Tip o' the prop beanie to: Robert Lauriston, Ann Okerson, Philippe Scoffie, Drue Miller, Jules Marshall, Kristin Spence, Jim Leftwich.



Clipping Clipper: Matt Blaze

In February, government spooks from the National Security Agency smiled smugly as the White House announced its endorsement of the Clipper Chip to replace the battle-scarred current standard, DES. Clipper, they proclaimed, is unbreakable. The announcement set off a storm of public debate.

Below the warp and woof of the public debate, however, few noticed the NSA quietly inviting encryption experts to "test" the vaunted Clipper Chip. Go ahead, try and break it, the NSA said. And while none of these experts succeeded in breaking Skipjack, the algorithm used in Clipper, in May a young researcher working for AT&T's Bell Laboratories, Matt Blaze, managed to put one hell of a dent in it.

Blaze discovered a mega design flaw in the technological "backdoor" of Clipper: the Law Enforcement Access Field (LEAF). The LEAF contains an encoded copy of the "session key" that can be used to read encrypted data. With information held in separate top-secret digital vaults by two government agencies, law enforcement should be able to decode the session key. Bottom line: corrupt the LEAF and cops can forget

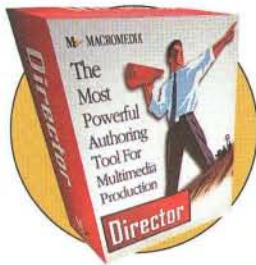
about unscrambling a Clipper-encoded communication of any kind.

The LEAF is protected by a 16-bit checksum, which is a kind of self-checking mathematical equation. But hold on, Blaze warns: any random sequence of 16 bits has a 1-in-65,000 shot at passing that checksum test. Generating that many numbers is a simple hack for even a pedestrian programmer. Blaze found it possible to generate a seemingly valid, yet "rogue" checksum in about 42 minutes. Blaze's method means law enforcement officials can't tell if they have a valid or bogus LEAF.

Blaze's discovery was but one factor precipitating a July 20 announcement by Vice President Al Gore marking the administration's retreat from Clipper. Other problems included a patent infringement lawsuit as well as massive protests from the software industry and civil rights advocates around the world. Clipper's role, according to Gore, has been reduced to voice communication only.

Blaze's research paper that helped sink Clipper is available through anonymous ftp at <research.att.com:/dist/mab/eesproto.ps>. —Brock N. Meeks

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It's the breakthrough you've been waiting for: Macromedia Director®, the most powerful tool for multimedia production, is crashing down the barriers to multimedia authoring on Windows™.

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DIRECTOR 4.0 FOR WINDOWS

sentations and courseware; popular edutainment titles like *TravelRama™* and *STAR TREK: THE NEXT GENERATION®*, *The Interactive Technical Manual*; intriguing games like *Gus Goes to CyberTown®* and *The Residents' Freak Show®*; interactive product demos like those that companies from Aldus to Microsoft are delivering to increase their marketing effectiveness; and even creative productions that extend your own personal vision as a performing artist.

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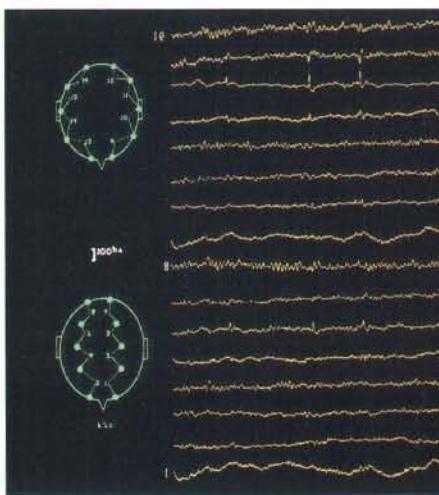
*Outside the US or Canada, call us at 1-415-252-2000 or fax us at 1-415-626-0554.

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Brain Waves on The Net

At the UCLA Medical Center, doctors can keep tabs on their patients' brains even when they aren't making their rounds. Each patient at the Neurosurgical and Trauma Intensive Care Unit has a bedside electroencephalogram monitor (showing brain activity), connected to a peer-to-peer network, in turn connected to the Department of Neurosurgery's LAN. Neurosurgeons can review patients' brain

waves from the office and phone instructions to the hospital. The computer team for neurosurgery has connected the LAN to the Internet. This allows a review of patients' vital signs and brain wave patterns from anywhere there's Net access. UCLA doctors have the ability to send brain wave data to specialists anywhere in the world, saving precious time, and possibly lives. — Rodney Bianco



► engineers are finding it hard to get work. Involuntary unemployment rates among engineers aged 50 and above were three times higher than in any other age group, according to the survey. Other fun facts: the average annual income of an electrical engineer in the US is more than US\$70,000, 68 percent of US engineers use e-mail, and the average engineer works a 9.2 hour day. Interested in the rest of the survey? E-mail ieeuusa@iee.org. **Tiger Tiger Burning Bright:** We went to Microsoft to check out the scene (we found nothing to contradict Doug Coupland's brilliant descriptions in *Wired 2.01*), and certainly the hottest thing there is Tiger, born of many late-night e-mail missives between Bill Gates and übergeek



TIRED

Clinton
Free O.J.
Universal Service
Cable TV
Melrose Place
@times
Manhattan
Hunter S. Thompson
Trade show booths
Football
Frame relay
David Spade for AT&T
Government intervention
Ray Gun
Celebrities

WIRED

Duckman
O.J.-free
Universal Access
Cable modems
Models, Inc.
Time on AOL
Sim City
William T. Vollman
Mosaic home pages
Soccer
SMDS
Bob Ross for MTV
Currency markets
SnowBoarder
Communities

Nathan Myrhvold, Microsoft's vice president of advanced research. (On the Microsoft IQ bell curve, Myrhvold rates way up there: he graduated from college at 14 and had three PhDs by the time he was 23.) From our notes on the Tiger demo: "Twelve streams of digital video (Look! It's *Sliver*! It's *Elvis*! It's *Sega*!) fast forward, rewind, play, and pause all at once. All this direct off 20 or so gigabytes of hard disk connected to 486-based servers. And it even disk mirrors and does redundancy! Pretty cool. You hear a lot about video-on-demand, but to actually see it happen is revelatory. While the system promises two-way high-bandwidth interactivity, the demo did not show it. Heck, that's not what gives cable TV execs a woody anyway." For more on our Microsoft tour, check out *HotWired* (info-rama@wired.com, with *get help* in the message body). **Base Opening:** Now open for business on AOL is Military City Online (keyword MCO). No kidding. Included in the conference lineup are classifieds (where you can pick up a US\$4,500 Thompson machine



Fanatics

Move over Nintendo! A game made of paper has harnessed the power of the Net. *Magic: The Gathering*, a card game released in August 1993 by Wizards of the Coast in Renton, Washington, became an instant hit among teenagers, and fans have flocked to cyberspace, creating a booming *Magic* culture there.

The object of *Magic* is

simple. Each player acts as a sorcerer trying to drive the opponent from the land of Dominia. The cards are slightly smaller than baseball cards, and are sold in starter sets of 60 playing cards (US\$7.95), supplemented with Booster Packs of 15 cards (\$2.45) and Expansion Sets (prices vary). The cards determine spells, artifacts, and enchantments.

Players build their card decks according to their own strategies, based partially on the extent of their card collections, and this adds to the fun of the game. Even a master collector can draw a bad hand — the game has myriad variables, and a player with a measly deck can still win with a little luck. The game also rewards players who have



Prediction, as Niels Bohr once noted, is difficult. To help build a better crystal ball, economists Linda Nazareth and Benny Tal at the Canadian Imperial Bank of Commerce (CIBC) are turning to a technology from the world of artificial intelligence: neural nets. They claim that nets provide better forecasts of Canada's gross national product (GNP) and inflation than the usual econometric models. Just as important, they have shown how neural nets and traditional economic models can do better together than each can do separately.

CIBC's conventional models of Canada's GNP tended to underestimate growth in Canada's booming economy and to overestimate inflation. Nazareth and Tal reckoned that this was because the relative simplicity of the mathematical formulas in traditional models could not capture the complexity of the relationships among the factors underlying economic growth and inflation — wages, commodity prices, interest rates, and so on. Neural nets, they reckoned, could do better. And, armed with Brain-



Maker Professional neural net software from California Scientific, they tried to do just that.

Instead of plugging data into pre-existing formulas, neural nets teach themselves the relationships between inputs and outputs. For example, CIBC uses 10 different economic statistics to predict inflation. The neural net starts by assuming some random relation between the 10 statistics and inflation. Then, using historical statistics, the net is

taught to improve its guesswork by repeatedly comparing its prediction to the actual outcome. Each time its prediction is wrong, the net re-tweaks the relationships between the inputs in a way designed to reduce the error. Eventually, the net teaches itself to predict inflation.

But the very complexity and customization of the nets is also their greatest potential drawback. Nowhere in the net is there any idea or explana-

tion of why the inputs might be related in such-and-such a way with outputs. The net is trained empirically, and the technology will just as merrily try to find relationships between the cycles of the moon and inflation as between wage rates and inflation. Unless the person training the net already has a good idea of which data will help predict inflation, and why, there is a real risk of creating a profoundly flaky crystal ball — which works for a while and then just stops working.

So, Tal and Nazareth say they prefer to use neural nets and traditional models together. Traditional models help them understand basic relationships between variables; nets create more complex, subtle, and customized versions of those basic relationships. Both EconoNet and PriceNet, models Tal and Nazareth designed, have shown tentative signs of outperforming the traditional models from which they were created, and the two economists are looking for new futures to gaze at through their neural crystal balls. — John Browning

gun) and a "military mall" (restricted access, use of a valid social security number required). **III** They Have a Sense of Humor, Anyway:

Tom Kalil, the "David Letterman of the Clinton/Gore administration" announced the administration's "Top Ten Reasons why the White House Staff Likes the Internet" at his closing keynote at INET'94/JENC5 in Prague earlier this summer. Some of the highlights: "We have access to the Top Secret Air Force server with cool gifs of UFOs and little green men"; "We get all that great electronic fan mail on the Clipper Chip"; "We love getting flamed by rabid libertarians on 'com-priv'"; and "On the Internet, no one knows you're a bureaucrat."

III First Battle in the Memetic Viral Wars: Remember those dork lawyers who swamped the Net with advertising? Well a young Norwegian hacker came up with a nifty — and scary — little "Cancelbot" program that sniffs out any and all posts from the grandstanding lawyers, then erases them. Hmmm. This prompted Dave Farber, noted Net.poster, to wonder where all this technology is taking us. "How about a Cancelbot that erases all the e-mail YOU post anywhere — have any enemies? How about your landlord, or your mother-in-law, or your 15-year-old, or your ex, particularly that 15-year-old? — Or how about one which injects some fascist or racist comments in place of your own golden ►

extensive knowledge of trivia and rules.

Demand for the game has been stunning. Wizards of the Coast grew from seven employees to 70 in less than a year. The first shipment of 600,000 cards sold out in four days. The company produces 65 million cards per month, but can't keep up with the demand. Dave "Snark" Howell

(snark@wizards.com), the company's cyberspace liaison, estimates there are around 80,000 Magic players.

Despite its low-tech origins, Magic owes much of its success to the Net, both for customer support and production. The company has been online since the beginning, and recruited many of its employees by scanning Magic Usenet

groups for the friendliest, most knowledgeable Magic maniacs. And the Net is loaded with online newsletters, strategy guides, product information bulletins, and Web pages.

Magic is portable, inexpensive, and fun to play. It encourages interaction between players. And — in a world typically populated by fanboys — women are playing this game!

Howell says: "We're really excited that young males aren't the only people who enjoy the game." What good businessperson wouldn't be?

— Anita Brenner (brenner@well.com) with Andrew Torres (torres@cyberspace.org)

Wizards of the Coast: +1 (206) 624 0933, e-mail: questions@wizards.com.

WIRED TOP 10



Best Selling Toys in June 1994

from the Archie McPhee catalog

1. Martian Popping Thing –

Rubber alien whose eyes, ears, and mouth bug out when you squeeze its belly.

2. The Fighting Nun –

Forget the singing nun, this puppet throws a holy left hook.

3. Deluxe Rubber Chicken –

Comes with explanation of how the chicken joke originated during the French Revolution. Seriously!

4. Tube of Gloom –

Sound tube that moans and groans when you tilt it.

5. Rubber Eyeballs –

Complete with optic nerves. They look great in Jell-O.

6. Magic 8 Ball –

Why bother with high-priced prediction machinery? Do it yourself.

7. Popping Potato Gun –

Shoot nutritious spuds at your co-workers.

8. Red-Eyed Gecko –

10 1/2 inches of rubber reptile fun.

9. Australian Frilled Lizard –

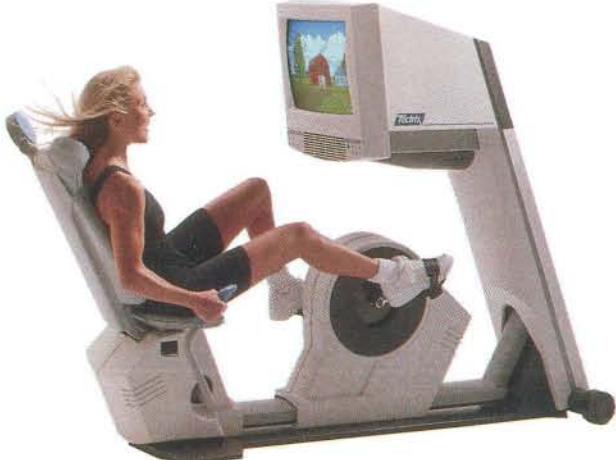
Not quite as popular as the above-mentioned gecko, it still makes for a heck of a "monitor" lizard.

10. Tiny Treasures Assortment –

Like raiding a gumball machine. Hundreds of tiny toys, animals, and plastic bugs.

Source: Archie McPhee catalog of toys, novelties, and pop culture junk. Info: +1 (206) 782 5737, mcphee@halcyon.com. — Gareth Branwyn

Virtual Sweat



The AIDS Database

A group of scientists at the Stanford University Medical Center are designing an AIDS database they hope will bring new treatment procedures to those with HIV-related diseases. Currently, many community-based AIDS treatment centers and healthcare workers can't keep up with the details of particular experimental treatments and who may be eligible for them. The T-Helper II database, according to research head Dr. Mark Musen, "identifies available treatments and brings them to the attention of the person seeing the patient."

The T-Helper II, scheduled for beta-testing this fall, automatically matches a patient's records with suitable new experimental treatment protocols geared to the individual's needs. The system also indicates what steps should be taken to avoid problems that could

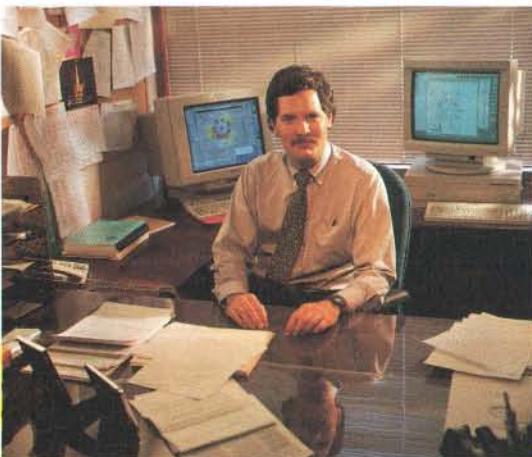
arise from combining suggested treatments with previously assigned ones.

A related system, T-Helper, the development of which began in 1991, stores and organizes patient records that have been manually entered or electronically transferred from treatment centers' previous databases. It is currently being tested by two California-based AIDS treatment centers.

Musen stresses that privacy is paramount when establishing patient-record systems. With the T-Helper systems, healthcare providers must enter passwords to access records. Before records can be removed from clinics for outside research, they are stripped of patient names and other identifying factors and are only referenced by a scrambled number.

The group hopes that the T-Helper II will serve as a model for developers of the next generation of computer-based patient-record and treatment-protocol systems that could also be accessed online. "The goal is to move the focus of clinical research into the community where most patients would prefer to be treated," Musen says.

For more information, write to: Section on Medical Informatics, Stanford University School of Medicine, Stanford, CA 94305-5479. — David Pescovitz



► prose, still signing your name? ... How does censorship work now, for print and other nonnetwork media?

Market forces in the US, perhaps; social consensus, government control, and religion elsewhere. Someone

had better bring some balance to bear, soon, on the Internet, or we may all get stuck in the crossfire between

the ambulance-chasers and the 'Cancelbots.' Makes you think. ■■■

One reason more people don't exercise regularly is that working out — particularly on stationary bikes in health clubs — is just plain boring. CyberGear, a Cambridge, Massachusetts, start-up, wants to change that with a VR bike simulating the fun of outdoor exercise.

The bike faces a 19-inch monitor displaying a square kilometer of virtual terrain drawn in real time. You are given complete freedom to go anywhere within that terrain. If you try crossing a stream, the pedal tension increases accordingly. If you round a sharp turn at high speed, the handlebars dip and the bike frame tilts. There are even virtual racers who compel harder exercise by goading you to race

them. Of course, there's nothing to prevent you from taking a shortcut. CyberGear's active soundtrack adds to the "outdoor" experience.

Sweeney Town, the first version of the software, depicts a New England countryside complete with roads, a church, a bar, a mill, and a cliff. CyberGear President Mike Benjamin admits that the current graphic interface "is not the most realistic, but it is absolutely seamless." Later versions will re-create an underwater scenario (in which you're a fish in the middle of a very interactive food chain) and even outer space. The latter will probably require a "weapon" upgrade to keep the videogame crowd happy. "People want a trigger," says Benjamin. Cyber-

Gear is also making the bikes network-ready, so you can cycle with friends.

Prototypes of the VR bike have tested well, though Sweeney Town's hazards can be a little more than virtual: Benjamin once actually sheared off the bike's crank when he got stuck between two virtual oak trees.

The bike will be manufactured by Tectrix Fitness Equipment of Irvine, California, and will be marketed to health clubs for about US\$6,000 each. Unless it pops a simulated tire, the VR Bike could be in a gym or fitness center near you by the time you read this. CyberGear: +1 (617) 491 3252, fax +1 (617) 491 3354. — Jerry Franklin

Newton connects. When you carry a MessagePad™ 110, the new  Newton® communications assistant from Apple, you carry the power that

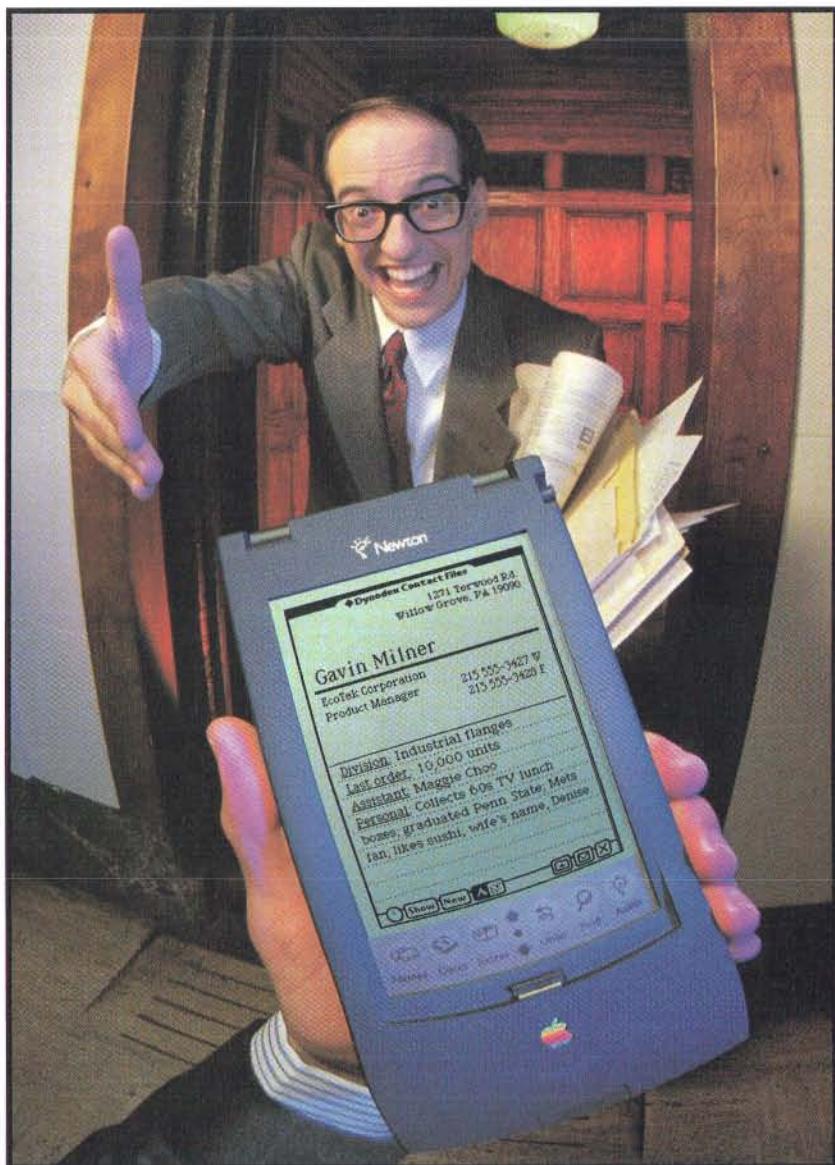
comes from having information at your fingertips. Which means no matter where you go, you always have access to the facts you need, at the moment you need them.

With the Newton Connection Kit 2.0 for Macintosh, you can exchange information with your Macintosh, as well as with a range of popular Mac® software, such as ACT! contact manager, Lotus 1-2-3, Excel and Microsoft Works.*

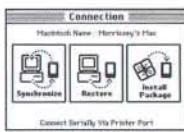
So now you can do things like reference sales leads from Dynodex and work with data created in Microsoft Word, all from the palm of your hand. And if you're working on a PC running Windows, the Newton Connection Kit 2.0 for Windows will allow you to easily do the same with all your current Windows applications.**

To find out more, call 800-365-3690, ext. 100, for the Newton dealer near you. Or check out an on-line service for the interactive demo found on the Newton forum.[†] Either way, you'll find that instead of giving you more technology, Newton gives you something you can really use: help.

Newton. It's there when you need it. 



Newton connects to Windows.
With the Newton Connection Kit for Windows, you can easily exchange information with your Windows-equipped PC.



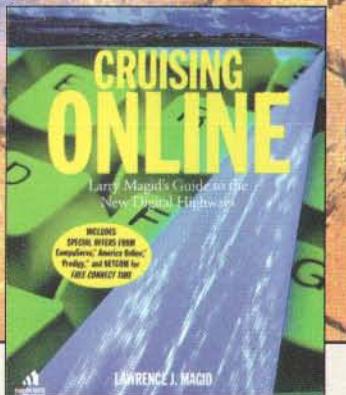
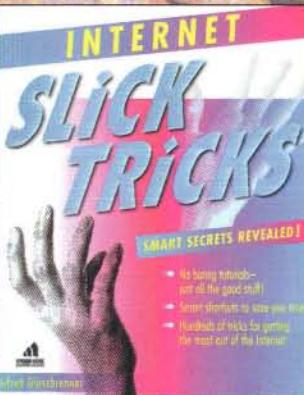
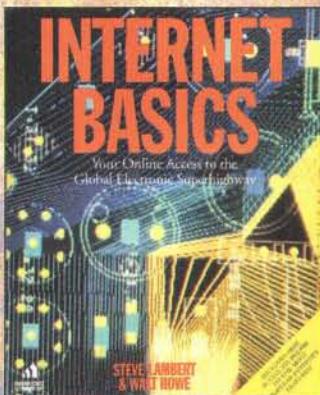
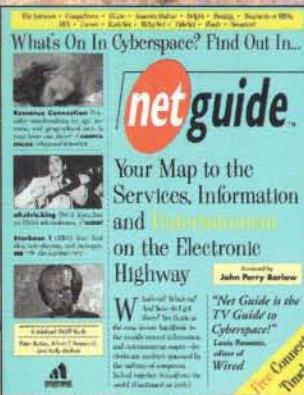
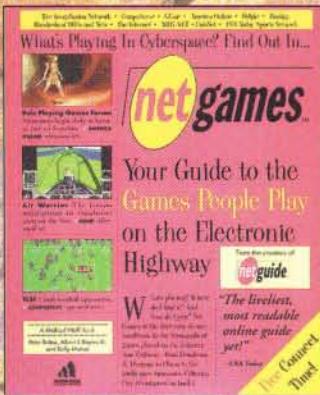
Downloading, updating and backing up information between your Newton and your computer is as easy as plugging in.

Newton connects to Macintosh.
The Newton Connection Kit lets you work with your Macintosh via serial connection or your AppleTalk® network.



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Net Guide™ is the first complete directory to the amazing array of cyberpossibilities. From the bizarre to the practical, *Net Guide* has more than 4,000 listings by subject for the Internet, the commercial online services and BBSs—and with free online updates, it will never go out of date! "Net Guide is the TV Guide® to Cyberspace!"— Louis Rossetto, editor of *Wired* 0-679-75106-8, \$19.00

Save money, save time, work faster and better with *Internet Slick Tricks*. It's full of practical shortcuts, concise explanations, and lots of great tips for using the Internet. It presents hundreds of fast ways to navigate the Internet, send and receive e-mail, search and retrieve information, download and manage files, and much more. 0-679-75611-6, \$16.00

Internet Basics gives you a step-by-step tour of the most popular Internet resources, covering all the commands and providing you with clear instructions and vital information on access points, user interfaces, research techniques, etiquette, and setting-up your modem and software. 0-679-75023-1, \$27.00

Cruising Online points you to the many attractions on Compuserve, Prodigy, and America Online helps you understand their distinct features, and provides a primer on the Internet. It's your one volume guide to getting online and to making the most of your time there.

0-679-75155-6, \$25.00



The Wailing Wallmount

Bang & Olufsen's BeoSound 2000 is a compact music system that includes a CD, cassette deck, AM/FM tuner, and 50-watt dual-amplified loudspeakers, all nicely consolidated into an optional wall-mount design only 4 inches thick. BeoSound senses your hand as you reach for it, and a tinted glass door automatically opens to reveal the control panel. When you select a music source, only the controls relating to that source remain lighted. You can set up the CD player to dub cassettes, and a special feature called Start/Go automatically rewinds tapes to the beginning before it plays them. BeoSound 2000: US\$1,595. Bang & Olufsen: (800) 323 0378, +1 (708) 299 9380.



F E T I S H

Edited by David Jacobs

Fleet Feet

Designed by people who live to skate, Voodoo In-Line Skates have the support of good hiking boots and the comfort of daily running shoes. They're great for high-speed hill descents, and the extra support and isolator midsoles add shock absorption for rough roads and rad turns. They're breathable too, so you won't stink up the place when you take them off. Voodoo In-Line Skates: US\$369.95. K2 Corporation: (800) 426 1617, +1 (206) 463 3631.



Share Your Seurat

Canon's awesome CJ-10 Color Copier drew nerds out of their black-and-white world. Now Laser Today's ColorLink fax software lets them share their vibrant visions over the phone. Used in conjunction with the CJ-10 and a high-speed modem, ColorLink sends image files or scanned documents to a CJ-10 anywhere on the planet. No CJ-10 on the receiving end? No problem. The free ColorLink receiver-only software lets people with a computer and modem receive color documents as data files. Canon CJ-10: US\$5,999. Canon: (800) 652 2666, +1 (714) 753 4000. ColorLink: \$995. Laser Today International: +1 (415) 961 3015.

Cyberspace in Your Backpack

It feels great to get away from it all, but it's tough when you need to jack into cyberspace on a moment's notice. For maximum connectivity you need the AirCommunicator. Use it with your laptop to make cellular phone calls, send faxes, or access the Net with its 57,600 bps modem. The AirCommunicator comes bundled with communications and fax software and uses proprietary error-checking software that boosts throughput. AirCommunicator: US\$1,595. Air Communications Inc.: (800) 247 3282, +1 (408) 749 9883.

A New Set of Sense Organs

You're scaling a sheer rock cliff. The next section of the climb will take one hour. Should you move on? Well, it's 3 p.m., 55 degrees Fahrenheit with a steady barometer, and you're heading 30 degrees NNE at 5,000 feet. Go for it! How did you get all this information? Not on the Internet. You just glanced at your Casio Triple Sensor ATC-1200 watch. The Triple Sensor has a digital compass, altimeter, barometer, and thermometer. So wire up your wrist and explore the world with your sensors on. **Triple Sensor ATC-1200: US\$249.95.** Casio Inc.: (800) 634-1895, +1 (201) 361 5400.

World Band in Your Hand

Get a world of information in your hand with Sony's ICF-SW100 world band receiver. Whether you're in Bali or the Silicon Valley, you can receive almost all the world's broadcasts — from microwave to FM stereo, shortwave, and longwave. Information is presented on a sharp LCD display, and the unit has an easy-to-use control panel for setting stations, time zones, and timer functions. I never forget to toss this half-pound puppy in my carry-on bag. **ICF-SW100: US\$450.** Sony: (800) 222 7669, +1 (201) 368 9272.



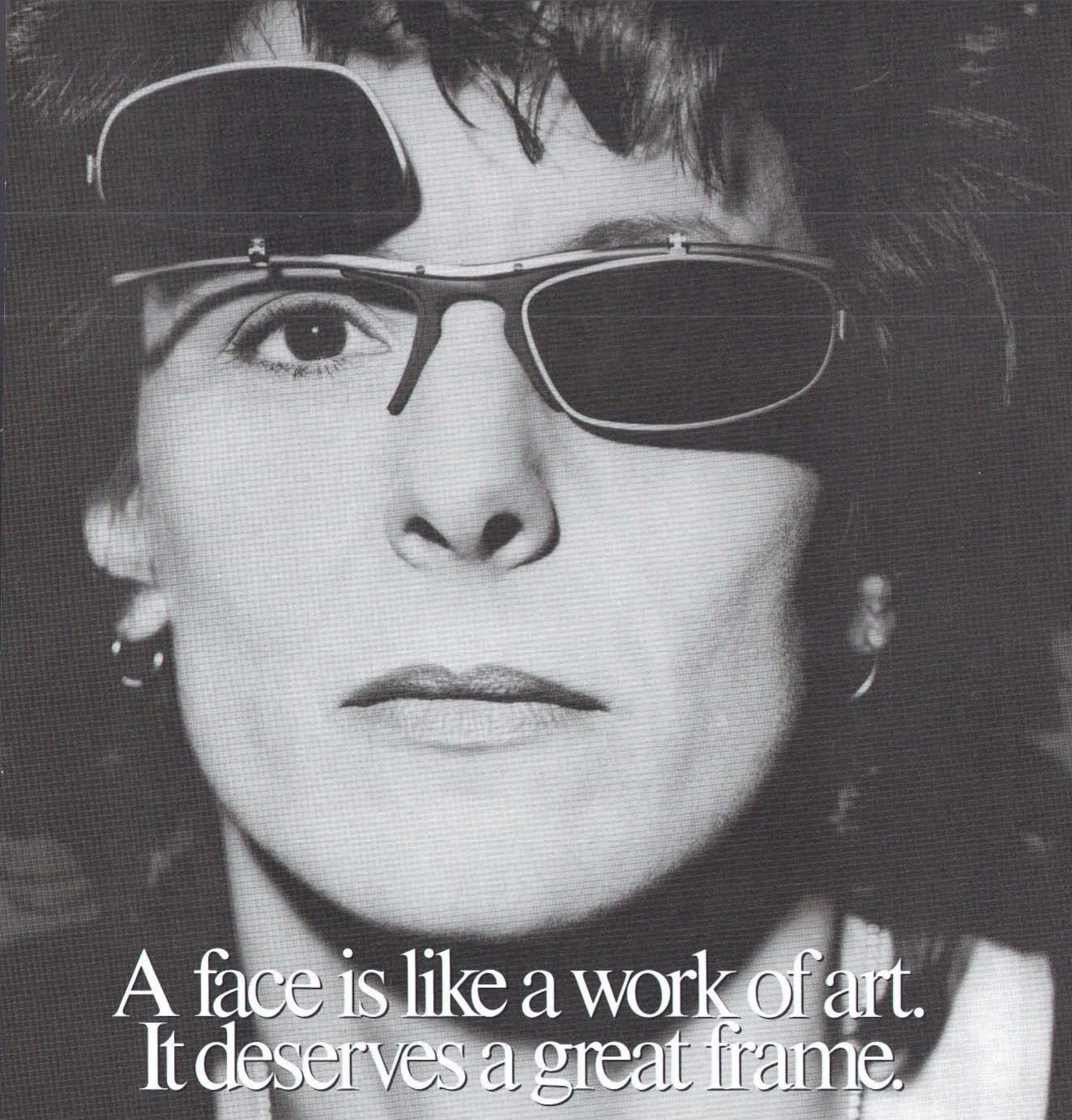
► Mega Veg-Out

Even a great 35-inch TV can't give you the movie theater experience at home. This has as much to do with the aspect ratio as it does with the size of the screen. That's why Toshiba built this 56-inch rear projection TV with the same width-to-height proportion as today's movie theater screens: 16 to 9. Built-in and external surround speakers are driven by a Dolby Pro Logic decoder and a 68-watt amp that'll make you feel like you're at the Bijou. **56D90: US\$4,000–\$5,000.** Toshiba: (800) 631 3811, +1 (201) 628 8000.



A Rube-Free Vacation

One of the few places on earth where you can escape tourist hordes is the ocean floor. But as great as scuba diving is, you can't stay down for very long. If you want to extend your voyage to the bottom of the sea, try the C-Questor, a fully submersible vehicle that looks more like a sci-fi space pod than a personal submarine. It can descend to 130 feet and comes equipped with air conditioning, a radio, lights, and a life-support system that'll keep you supplied with air for up to three days. (It's up to you to figure out how to log on to the Internet from 100 feet below the surface.) **C-Questor: US\$85,000.** C-Q Industries Ltd.: +1 (604) 463 3447.



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Keep Your Hands on the Wheel

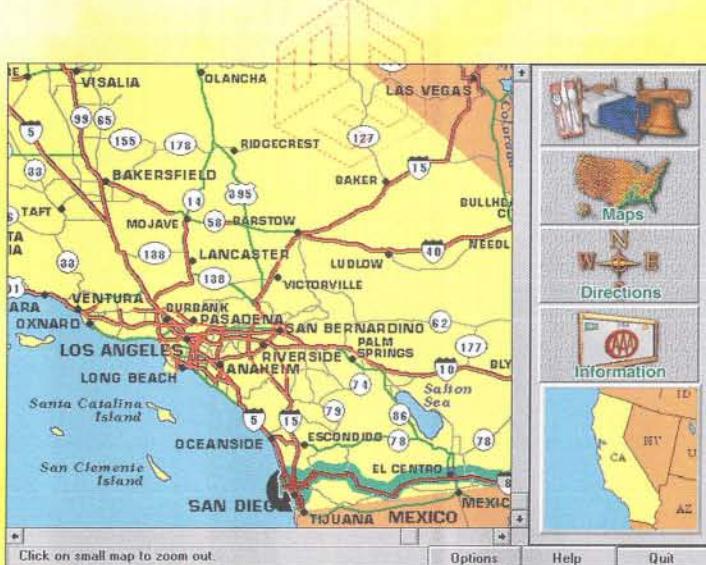
Most phones are for talking through, but here's a car phone that you can talk to. The 3050 cellular phone from AT&T features a voice-recognition system that frees up your hands to do important things, like steering. You can tell the 3050 to dial one of 60 different numbers stored in its memory, to answer a call, or to hang up. If you don't like to drive and jot down notes at the same time, you can use the built-in voice memo pad. Finally! You can simultaneously drink coffee, shave, and wage business while you tear down the highway. 3050: US\$399.99. AT&T: (800) 232 5179, +1 (201) 581 4067.



Beam Machine

Videographers who need to make a big splash at presentations or people who just can't wait to get home to view their vacation adventures will love the CPJ-7 portable LCD projector from Sony. It hooks up to any camcorder or videocassette player and will project images onto an area as large as 100 inches wide. The built-in stereo speakers will provide punch to the presentation. The CPJ-7 is light and small enough to stow in your camcorder bag and tote to the next gig. CPJ-7: US\$800.

Sony: (800) 222 7669, +1 (201) 368 9272.



Moto Moto

One of the fastest street-legal racing motorcycles in the world, the Ducati 916 is built on a traditional steel frame, but everything else is about reinventing the motorcycle for extra speed, handling, and safety - from the single-sided swing arm in the rear that gives you greater stability to the dual halogen headlights in the front for extra visibility. Weighing only 429 pounds, this Italian stallion packs a whopping 114 horsepower (more than a lot of automobiles). But it's the beauty of the 916 that'll make your fetish feelers really throb, even when it's parked in your garage. Ducati 916: US\$14,500. Cagiva North America Inc.: +1 (201) 839 2600.

Road Disc

When I was a kid, my parents always picked up a copy of AAA's TripTics before planning a family vacation. Now before I embark on a cross-country drive, I spin up Compton's AAA Trip Planner CD-ROM instead. It combines a travel information database - which gives ratings on hotels, restaurants, and points of interest - with mapping and intelligent routing software developed by GeoSystems. Your next jump out of cyberspace is just a click away. US\$59.95. Compton's NewMedia: (800) 862 2206, +1 (619) 929 2500.

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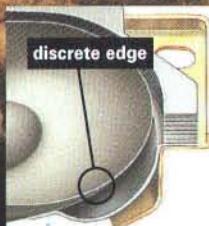
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The Future of Transportation

You've heard the hype.
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timetable.

According to the US Department of Transportation, US citizens traveled a total of 2.24 trillion vehicle miles in 1992. A 1993 US Bureau of the Census report reveals that less than 1 percent of Americans ride bicycles to work, while 88 percent continue to commute by car. Since the invention of the wheel,

engineers have been incessantly updating methods of shuttling humans and cargo from point A to point B. Where do we go from here? Wired asked five experts to consider the future of transportation and to predict how long it will take us to get there. —David Pescovitz

	Automated highway systems in US cities	More than 50 percent electric cars on US roads	Commercially viable magnetic levitation trains in US	Robotic road workers	Jetpacks
Thomas B. Deen	2030	2025	2010	2000	2050
Richard L. Klimisch	2025	unlikely	2010	2025	2000
Noah Rifkin	2010	2010	2015	1994	unlikely
Steven E. Shladover	2010	2050	never	1996-99	never
Rupert Welch	2010	2050	2050	1996	2020
Bottom Line	2017	2034	2021	2003	unlikely

Thomas B. Deen
executive director,
Transportation
Research Board

Placing your car on autopilot may be the solution to highway gridlock. Deen, Klimisch, and Rifkin quote the Intermodal Surface Transportation Efficiency Act of 1991, which aims for a test of such a system by 1997. The others polled

A large deployment of electric cars will happen only if a battery is developed that doesn't need frequent trips to a central recharging station, according to Deen and Welch. Research leading to more electric cars will occur

Welch thinks the technology used in "smart pig" robots to repair pipelines could be altered to find and repair cracks in asphalt. According to Deen, an automated pothole-patching machine that "sees" road cracks and fills them was developed in 1992 by the Strategic Highway Research Program. Rifkin agrees

The jetpack made famous by *The Jetsons* and developed for real battlefield use probably will be found in high-tech toy chests instead of garages — because of high cost and low safety — according to Klimisch. Costs are simply too

Richard L. Klimisch
PhD, vice president-engineering, American Automobile Manufacturers Association

Transportation Efficiency Act of 1991, which aims for a test of such a system by 1997. The others polled

trips to a central recharging station, according to Deen and Welch. Research leading to more electric cars will occur

mag-lev could be commercially viable if superconductors that operate at room temperature are developed. However, Welch and Deen agree that mag-lev trains don't have enough of an advantage over high-speed, steel-wheel

high for personal use, according to Deen. Rifkin also cites "unknown market demand" as a barrier. Shladover thinks jetpacks will not become popular unless

Noah Rifkin
director of technology deployment, United States Department of Transportation*

agree that we will see a full-fledged experiment around the turn of the century and predict that deployment will follow. However, Welch says mainstream use will be impractical, as the necessary technology will jack up car prices by thousands of dollars.

"because of regulatory pushes, not because of desirability to the consumer," Shladover says. Klimisch thinks electric cars will be practical only for city use. Welch thinks battery cars are not needed for drastic environmental improvement because "air standards could be reached

mag-lev trains don't have enough of an advantage over high-speed, steel-wheel trains to justify the funding they'd require. "We won't have mag-lev trains," says Deen, "until some government somewhere decides it wants to make it happen," which he estimates could occur by 2010.

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Steven E. Shladover
acting director, California Partners for Advanced Transit and Highways

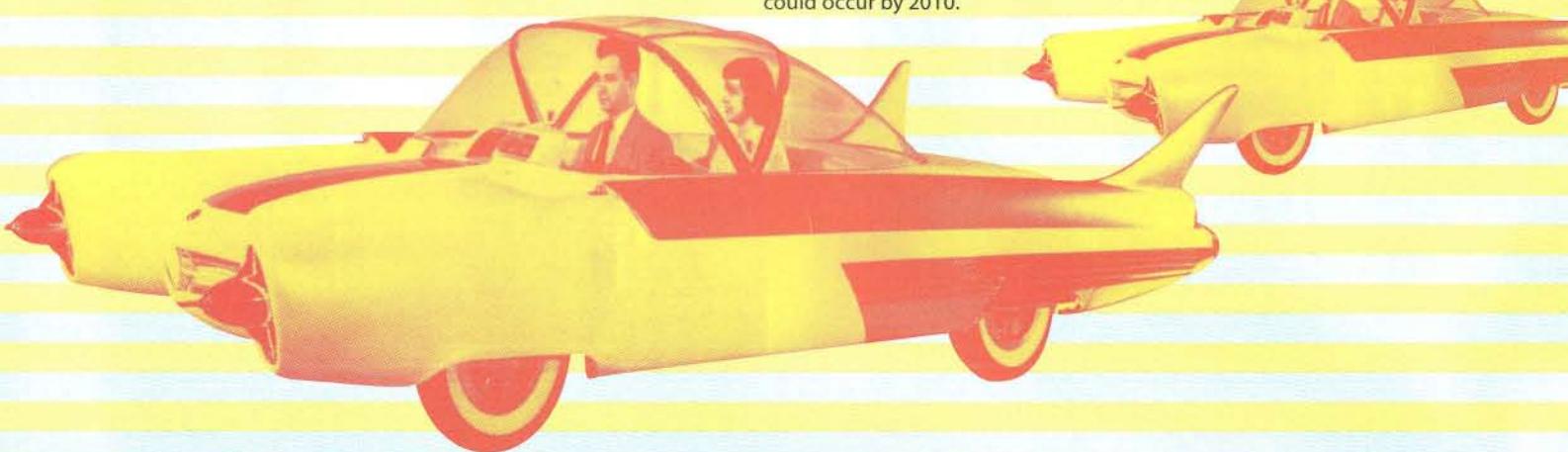
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because "air standards could be reached today by getting older cars off the road."

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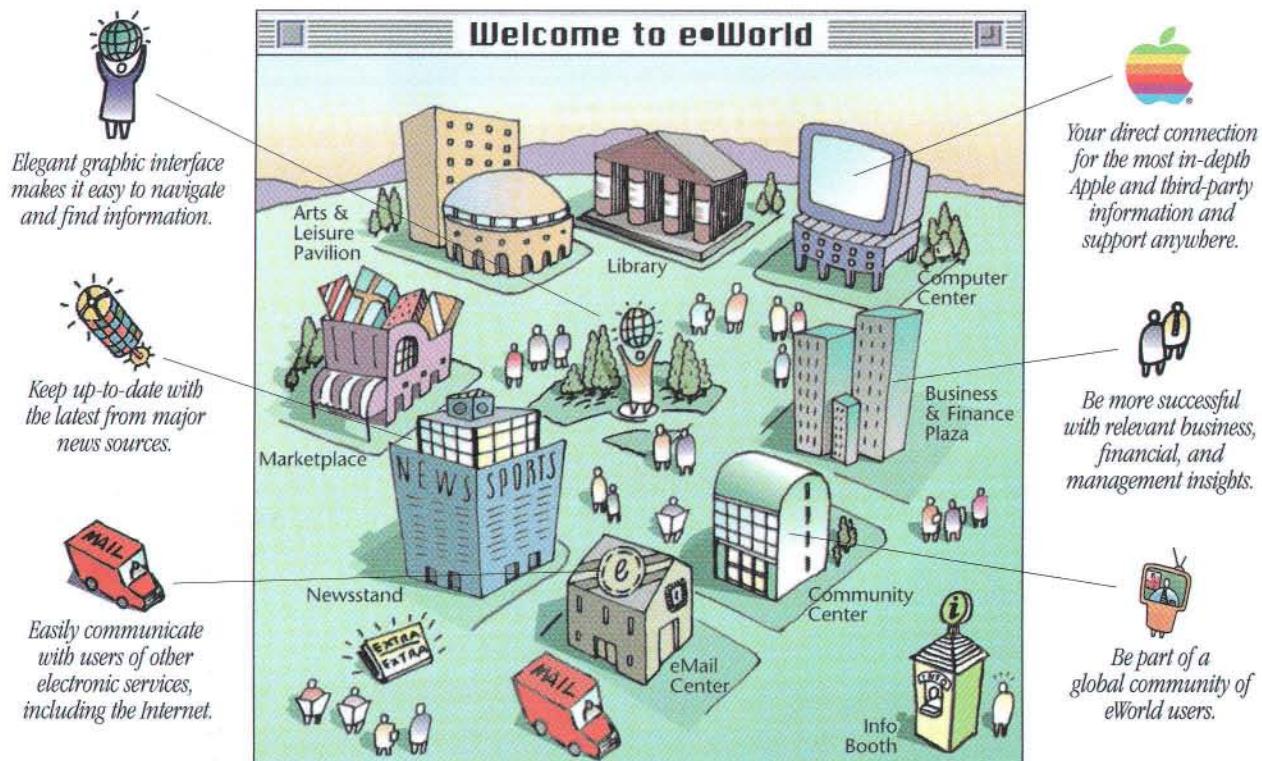
"nuclear fusion makes energy so cheap that this technology becomes viable."

Rupert Welch
editor, Inside DOT & Transportation Week



*his views are his own and do not necessarily reflect the opinions of the department.

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Online or Not, Newspapers Suck

How can any industry that regularly pulls Doonesbury strips for being too controversial possibly hope to survive online? By Jon Katz



For millions of Americans, especially young ones, newspapers have never played a significant role. That's why it's sometimes hard to know, recall, or even imagine that there's almost no media experience sweeter – at the right time, in the right place, with the proper accessories – than poring over a good newspaper. In the quiet morning, with a cup of coffee – so long as you haven't yet turned on the TV, listened to the radio, or checked in online – it's as comfortable and personal as information gets.



The institutions of journalism seem in desperate need of some mechanism for reconnecting with an alienated public, and they don't need to transform themselves into online publications to do it.

cians, delving into health care and other complex issues. They can be deliciously quirky, useful, even provocative – filled with idiosyncratic issues and voices.

They're under siege, of course. Newspapers have been foundering for decades, their readers aging, their revenues declining, their circulation sinking, their sense of mission fragmented in a world where the fate of presidents is slugged out on MTV, *Donahue*, and *Larry King Live*. Television has stolen much of their news, magazines their advertisers and best writers, cable many of their younger readers. And the digital revolution has pushed them still closer to the wall, unleashing a vigorous flow of news, commentary, and commerce to millions and millions of people. CompuServe and CNN ensure that newspapers are stale before they're tossed on the trucks. With the possible exception of the comics, everything a newspaper used to do somebody else is doing more quickly, more attractively, more efficiently, and in a more interesting and unfettered way.

The newspaper industry has never liked change, viewing it rather the way a Temperance Lady viewed speakeasies. For a long time, papers have demonstrated an unerring instinct for making the wrong move at the

wrong time. At heart, newspapers are reluctant to change because of their ingrained belief that they are the superior, serious, worthwhile medium, while things electronic are trivial or faddish.

Over the past decade, newspapers have made almost every kind of radical move except transforming themselves. It's as if they've considered every possible option but the most urgent – change. Times Mirror Co., publishers of the *Los Angeles Times*, bought newspapers, magazines, cable systems, and TV stations. Recently, the company appeared to be returning to its printed roots, selling off its cable properties a year after selling its TV stations.

That makes newspapers the biggest and saddest losers in the information revolution. With the possible exception of network-TV newscasts, papers are now our least hip medium, relentlessly one-way, non-interactive, and smug. We all know the formula: Plopped on the doorstep once a day. Breaking national and international news up front, local news next, stories broken up and jumping inside. Grainy, mostly black-and-white photos. Culture, features, TV, listings, recipes, and advice columns in the back. Stentorian voices on the editorial page. Take it or leave it, and if you don't like it, write us a letter.

But the growing millions of people sending and receiving news and their opinions of it to one another via modem is another story. Digital news differs radically from other media. No other medium has ever given individual people such an engaged role in the movement of information and opinion or such a proprietary interest in the medium itself. The computer news culture fosters a sense of kinship, ownership, and participation that has never existed in commercial media.

When in January 1994 a RadioMail subscriber used his wireless modem to flash news of the LA earthquake to the Net well before CNN or the Associated Press could report it, a new news medium was born. Within minutes, online services and BBSes had set up topics and conferences to relay information, pinpoint the quake location, notify distant relatives, and even – in some cases – organize rescues. No other information structure has ever been able to do anything remotely like it.

Meanwhile, after years of newspapers' ignoring computers or relegating them to the far corners of the business sections, you can't pick up a paper any longer without reading the words *e-mail*, *Internet*, or *cyberspace*. The media, burned so often by techno-hype, are belatedly realizing that this time it's not all fantasy.

You can practically hear them shrieking "OK, we get it!" So-called electronic publishing is the hottest thing in newspaper publishing since cold type, and one of the last

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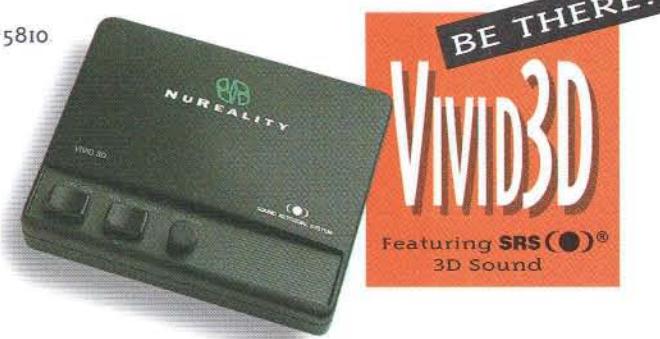


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great hopes for a reeling industry that is trying to preserve a vital role for itself.

One of the best arenas in which to watch the newspaper and computer cultures collide is America Online, where much of the nation's élite traditional media is scrambling to catch the train. There, side by side, two profoundly different information structures clunk into one another, new next to old, diverse next to homogeneous, Washington pundits one icon away from Smashing Pumpkins fans, the powerful few alongside the volatile and suddenly empowered many.

The Newsstand on America Online now offers more than 35 newspapers and magazines, one of the first and best known being the *San Jose Mercury News*'s pioneering *Mercury Center*, launched last year. Among the others on AOL: *Time, USA Today, The New York Times, The New Republic, Road & Track, Wired, National Geographic*.

The online explosion has caught newspaper publishers' attention, and what's left of their imaginations, blasting them off their self-important butts. This is where they are making their stand, haunted by the ghosts of cathode-ray tubes past. This time, publishers say, they're not going to be left behind, cut

out of all those profits, isolated from young markets, watching their influence erode.

In April, the chair of the Tribune Company in Chicago, citing the growth of online services and CD-ROM and the digitalization of commercial communications, announced to the Newspaper Association of America that "it's easy to make the case that over the last 12 months there has been an unprecedented movement that will profoundly change the industry." His sense of timing may have been off – lots of people have known about this "movement" for far longer than 12 months – but it is pretty simple to make the case: papers are going online.

But watching sober, proper newspapers online stirs only one image: that of Lawrence Welk trying to dance at a rap concert. Online newspapers are unnatural, even silly. There's too much baggage to carry, too much history to get past. They never look comfortable, except on some of the odd community message boards, when the paper ends up offering just another BBS, instead of a reinvention of itself.

The *San Jose Mercury News* has made the biggest and, by most accounts, the best-known newspaper online effort so far, with

its *Mercury Center* on AOL. The *Atlanta Journal-Constitution's* effort, *Access Atlanta*, appeared on Prodigy in March, free to subscribers for a month. *The New York Times* showed up on AOL in early June with a surprisingly un-newsy service, *@times*, that primarily offers reviews, listings, and message boards on the day's arts and entertainment. There are no live chat areas. *@times* was put together by the business side of the paper, with no journalists, columnists, or editors in evidence in its early weeks (it later issued an online apology for its lack of response and promised that *Times* staffers would soon get up to speed). Though hundreds of users tried to message *@times* and many asked for e-mail addresses for reporters, there was no one for them to talk to. Users could write letters to *@times*, but not to the newspaper through the service. There was very little interactivity of any sort.

The *Times* is partly hamstrung by the fact that it can't offer most of its past articles and reviews, having sold its electronic archival rights to Mead Data Central's Nexis a decade ago, when most of the media thought computer users were credit card thieves and national security risks.

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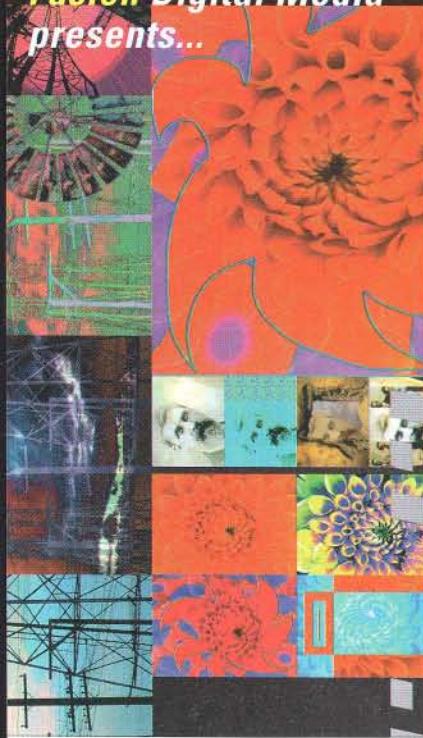


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ELECTROSPHERE

The *Washington Post* also plans to go electronic, initially for IBM-compatibles, using online technology, created by Ziff-Davis Interactive, that has so far been greeted with an enthusiastic buzz. The Post Company's Digital Ink subsidiary will offer many of the same visual elements as its printed paper – including *Post* logos, photos, and graphics – as well as e-mail, online conversation, advertising, calendars, and other listings.

The *San Francisco Chronicle* and the *San Francisco Examiner* are also about to join the online rush, with an online service (called the *Gate*) that provides news summaries, electronic mail, and access to the Internet. The *Los Angeles Times* is going online with Pacific Telesis. The Associated Press and United Press International already offer online news reports, as do many specialized financial, technical, scientific, computer, and

Much of what works – convenience, visual freedom, a sense of priorities, a personal experience – is gone.

trade publications. Newspaper analysts predict that by the end of this year, nearly 3,000 papers will offer some electronic or interactive services.

And though it's not exactly a newspaper, there will be lots of news on Apple's much anticipated eWorld, a user-friendly information and messaging service set up structurally and graphically as an electronic village.

The arrival of such media heavyweights means that journalism has already reached a critical mass online. There seems no turning back now.

The *San Jose Mercury News* project, being one of the first, is also one of the most monitored. In business terms, *Merc Center* has been disappointing: it's had a tough time attracting subscribers, and the program's designers say readers have had trouble grasping some of its services. The 6,200 subscribers who have signed on to America Online specifically through the *Merc Center* since its May 1993 debut represent less than 20 percent of America Online's 55,000 subscribers in the San Francisco Bay area, and less than 2 percent of the *Mercury News*'s 290,000 daily circulation. But lots of new media start small and then build.

Last fall, *Merc Center* added a service that allows readers without computers to punch

in codes to obtain information by fax. Subscribers pay fees of US\$2.95 for the phone and fax service and \$9.95 a month for the computer service that is part of AOL, which allows them to read the news via computer as it appears in the printed paper or use codes to call up information that's been edited out. Subscribers are encouraged to use bulletin boards and electronic mailboxes to communicate with the staff.

The paper's President and Executive Editor Robert Ingle certainly gets the picture: "Our communication historically has been: 'We print it. You read it,'" he told *The New York Times* in February. "This changes everything."

But does it? And should it?

So far, at least, online papers don't work commercially or conceptually. With few exceptions they seem to be just what they are, expensive hedges against onrushing technology with little rationale of their own. They take away what's best about reading a paper and don't offer what's best about being online. Online papers like *Merc Center* at least represent good-faith but primitive and expensive efforts to grapple with new realities. *@times* seems far more arrogant with its disregard for real interactivity, for any participation in the process by anyone other than *The New York Times* itself.

Online papers pretend to be seeking and absorbing feedback, but actually offer the illusion of interactivity without the reality, the pretense of democratic discussion without yielding a drop of power. The papers seem careful about reading and responding to their e-mail, but in the same pro forma way they thank readers for writing letters. They dangle the notion that they are now really listening, but that's mostly just a tease – the media equivalent of the politically correct pose. The real power, as always, lies not in online exchanges but in daily story conferences among a few editors who don't read e-mail. In fact, the familiar newspaper model lurks behind every icon: You can write us as many letters as you want, in a faster way than before, and we'll read them. But we're still going to decide what's important, and then we'll tell you. And we'll do it in a format that's even less pleasant, portable, and convenient than the paper itself.

To read the *San Jose Mercury News* or any other newspaper at home or work, you have only to spread it over your desk and read what catches your eye or intrigues you.

To read the *Mercury News* online, you have to go to your computer, turn it on, log onto AOL, go to the Newsstand on AOL, and click

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on the San Jose Mercury News line. When it opens on a larger Mercury Center graphic box, you choose from one of eight different elements and departments – In The News, Advertising, Entertainment, Bay Area Living, Sports, Business, Communication, News Library. A code text search permits readers of the paper to input special codes from the actual newspaper itself to call up stories or learn more about them. It's an interesting effort to provide an additional news dimension, but it seems a pointless one. If this information wasn't important enough to be printed in the paper, why should we pay to retrieve it? That's the point of a newspaper, after all – to filter the worthwhile information, then print it.

Users can also call up that day's paper – the front page, national and international news sections, local and state coverage, editorial and commentary, business, sports, and living. They can talk to the *Mercury News* by sending messages or communicate directly with the *Mercury News* library to search any day's paper.

But there is little the *Mercury News* offers online that AOL couldn't offer itself. The best thing about *Merc Center* – the community and special interest message boards, the chats with auto editor Matt Nauman or California Governor Pete Wilson – could also be provided in a non-newspaper context and, in fact, are at the heart of the computer bulletin boards that preceded online papers.

Reading a newspaper online is difficult, cumbersome, and time consuming. There is none of the feel of scanning a story, turning pages for more, skipping easily back to the beginning. The impact of seeing a picture, headline, caption, and some text in one sweep is completely lost. With news glimpsed only in fragments and short scrolls, the sense of what the paper thinks is important disappears. You can't look at a paper's front page to absorb some sense, however limited, of the shape your town, city, or world is in. You can't skip through a review for the paragraph that tells you whether to see the movie or not or skim through movie listings for show times. Much of what still works about a paper – convenience, visual freedom, a sense of priorities, a personal experience – is gone. Online, papers throw away what makes them special.

The online culture is as different as it's possible to be from the print press tradition. Outspoken and informal, it is continuously available, not delivered once a day. It is so diverse as to be undefinable, a home to scientists, hackers, pet owners, quilters, swingers,

teenagers, and homemakers. Online, there is the sense of perpetual conflict, discovery, sudden friendship, occasional hostility, great intensity, lots of business being transacted, the feeling of clacking through your own world while whole unseen galaxies rush above and below you. You log on never quite knowing what discussion or argument you'll be drawn into, which new people you'll meet, or who from your past will mystically appear. The experience bears no relationship to reading a newspaper. In fact, one of the major selling points of a paper is its organizational and informational predictability. The weather, sports, and TV listings are always in the same place, or ought to be.

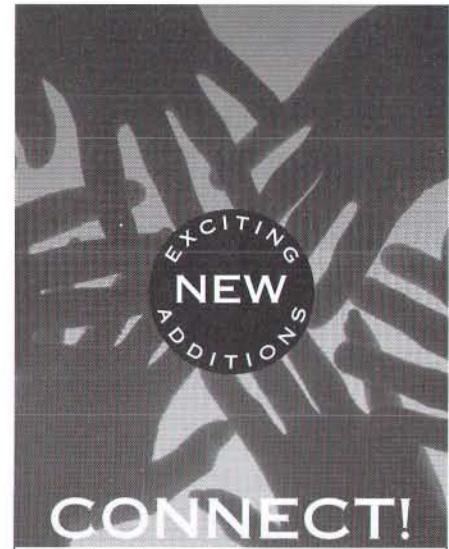
It doesn't have to work this way. These two media can coexist and complement one another.

One of the more interesting electronic publishing projects, a pointed contrast to the earnest but uninspiring *Merc Center* or the remote *@times*, is *Time* magazine's aggressive experiment on AOL. It's odd that *Time*, for years one of journalism's leading symbols of imperiousness and conservatism, seems to have grasped the real potential of interactivity better than almost anybody else.

To read *Time* online and offline is to sense that the new information culture is actually changing the magazine. Rather than simply shoveling *Time* online, the magazine's editors and writers have gone to considerable lengths and expense to understand and adapt to it.

For one thing, *Time* now covers new media better than its competitors. Not too long ago, it wouldn't have approved much of the freewheeling online communication style, complete with flaming, dirty words, and diverse opinions. Once it would have published a cover story just like *Newsweek's* silly "Men, Women and Computers" (in the May 16, 1994 issue), which stereotyped computer men as macho dirtballs and women as nurturing, delicate cyber-moms. Now, it wouldn't. *Time Online's* issues boards on AOL have become vigorous and democratic civic forums, with thousands of subscribers slugging it out around the clock about everything from Clinton's sex life to gays in the military. Anyone interested in journalistic accountability should drop by to watch *Time's* once-Olympian editors receive electronic drubbings from irate members of the National Rifle Association, retirees furious about coverage of entitlement programs, devout Catholics defending the Vatican's latest pronouncement.

One such thumping occurred following publication of the June 27, 1994 issue of the



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magazine. *Time's* Managing Editor Jim Gaines went online to face a record number of visitors – *Time* officials estimated the number to be at least 70,000 – including many outraged readers demanding to know why the magazine had altered a photograph of O.J. Simpson to make the picture appear darker than it was. The notion that a *Time* managing editor would face so many readers live is the

consulting editor Tom Mandel, a professional futurist and a longtime member of the Well, and chosen Senior Writer Philip Elmer-DeWitt, who covers the digital world, as its editorial guiding force. The pair seems to have brought with them the right combination of the values and traditions of both journalism and the Net. Mandel, whose own online style is to be ubiquitous and some-

online experiment is the intense, sometimes furious back-and-forth between *Time Online* subscribers and *Time's* writers and editors. Discussions in *Time Online* have also influenced stories in the magazine, Mandel said.

Time has gained only a handful of new subscribers from its online project and doesn't expect many. But it has gained more than a foothold online: it has become a part of the culture.

Newspapers, by contrast, seem to have missed the real lesson of the past half-century. Their mistake wasn't that they didn't invest in television or put their stories on screens, it was that they refused to make any of the changes that the rise of television should have mandated.

TV meant that breaking news could be reported quickly, colorfully, and – eventually – live. Live TV supplanted the historic function of the journalist. Cable TV meant a whole new medium with the time and room to present breaking and political news, entertainment news, live trial coverage. Computers meant that millions of people could flash the news to one another. All of these changes have given newspapers a diminished role in the presentation of news.

So far, at least, online papers don't work commercially or conceptually. They are expensive hedges against onrushing technology with little rationale of their own.

media equivalent of cows learning how to fly.

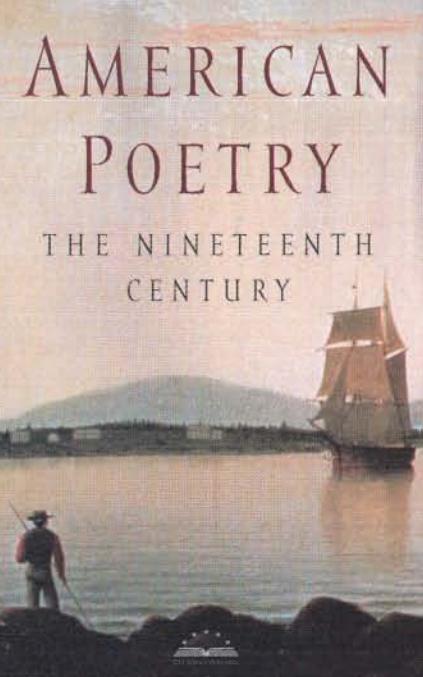
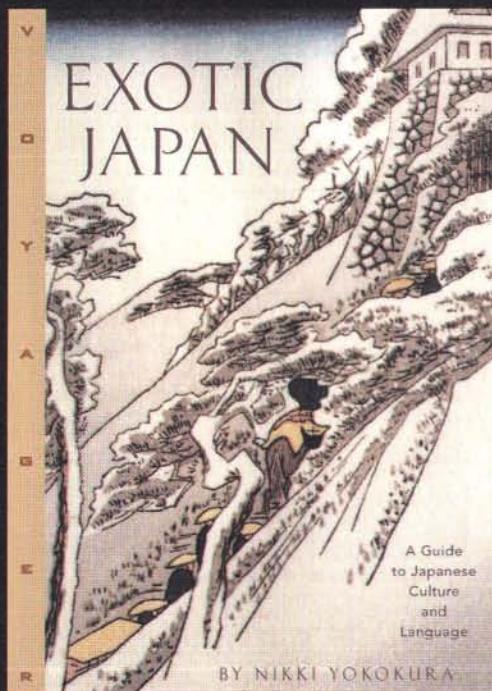
If *San Jose Mercury News* executives find the results of some of *Merc Center's* services disappointing, *Time's* are thrilled with *Time Online*. It appears designed not to replace the magazine or plop it into a different format, but to gain a toehold in cyberspace and even absorb some of its values.

From the start, *Time* seemed to grasp that online communications required a different ethic than a "Letters To The Editor" column, perhaps partly because *Time* had hired as

times aggressive, understands that real interactivity transcends Feedback icons.

Time also seemed to grasp online users' resistance to the blatant commercializing that dominated *Prodigy*. The magazine avoided advertising initially, but has inevitably added a product information icon to its AOL menu. Even there, though, the magazine seems to at least be conscious of the differences in culture – magazine readers expect blatant advertising but computer users don't.

But the more telling impact of *Time's*



But the explosion of new media needn't eliminate the traditional journalistic print function. Quite the opposite, it could make newspapers more vital, necessary, and useful than ever.

The more complicated the gadgets become, and the more new media mushroom, the more we need what newspapers have always been - gatekeepers and wellheads, discussion leaders on politics and public policy questions, distributors of horoscopes, sports listings, and comics. They're not going to have a monopoly any more, and they don't get to tell us only what they think we should know. They'll have to chuck the stern schoolmarm's voice. They'll also have to really listen to us, not just pretend.

If newspapers could do with more interactivity, they might not need as much as bulletin boards offer. Everybody can't be talking to everyone at the same time. We need distinct voices standing back, offering us detached versions of the best truth they can find in the most factual way. We need fair-minded if less arrogant fact-gatherers and opinion-makers to help us sort through the political, social, and cultural issues we care about but need help in comprehending.

We need something very close to what a good newspaper is but with a different ideology and ethic: a medium that gives its consumers nearly as much power as its reporters and editors have. A medium that isn't afraid of unfettered discussions, intense passions, and unashamed opinion. A medium that recognizes we've already heard the headlines a dozen times.

Online publishing seems to reinforce the idea that newspapers should look to the past, not the future, for help in figuring out how to respond to all this competition and pressure. What newspapers need to change isn't the delivery technology - it's the content of their papers. Even if they get all interactive and smart about going online, it's a marginal solution to a fundamental problem, and a diversion of resources that could be put to much wiser use.

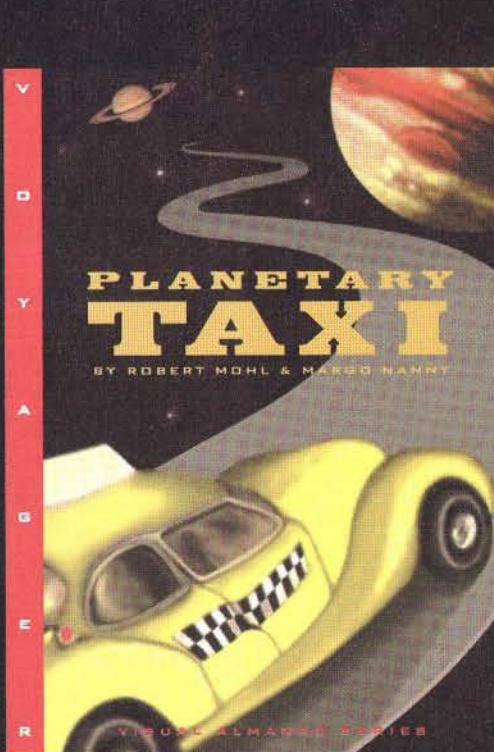
The *San Francisco Chronicle* is never going to beat the Well at its own game anymore than the Well could become a successful print daily, nor should it. Online services provide breaking news, are intrinsically interactive, and know much more about computers and technology.

Newspapers might begin to think about

reversing their long-standing priorities, recognizing that everyone with electricity has access to more breaking news than they provide, faster than they provide it. They should, at last, accept that there is little of significance they get to tell us for the first time. They should stop hiding that fact and begin taking advantage of it. What they can do is explain news, analyze it, dig into the details and opinions, capture people and stories in vivid writing - all in greater depth than other media. They should get about the business of doing so.

Newspapers remain one of the few elements of modern media that refuse to bid for talent. As a result, they've long ceded many of their best writers and editors to publishing or magazines. Newspapers now have little original or distinctive writing: when newspaper reporters do have something extraordinary to say, they are often forced to go outside their medium to give their stories the treatment they merit and to gain full impact. Papers ought to reclaim this territory, seeking out provocative writers, giving them freedom, paying to keep them.

And the newspaper industry's relentless alienation of the young is the corporate



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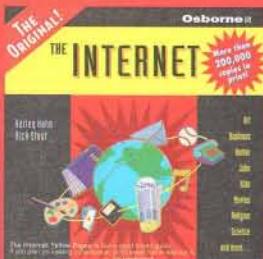
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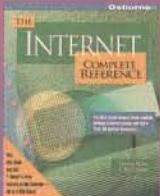
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ELECTROSPHERE

equivalent of a scandal. Big city papers have almost no young staffers, now that it takes years to work through elaborate hiring structures and rigorous trials to get to urban metro desks. In addition, papers have trashed almost every significant part of youth culture for decades – from rock to radio to TV to rap and videogames – portraying each as stupid, violence-inducing, and dangerous. Hackers were mostly portrayed as weirdos while newspapers dozed through the arrival of another new medium that the nerds were piecing together in basements and bedrooms.

Newspaper publishers then hold regular conventions at which they wring their hands in bewilderment at the loss of younger readers and despair even more at those lost advertising dollars. Kids' tastes are no great mystery, not to cable TV or to a whole new generation of magazines. The young are busy

If newspapers are going to invest heavily in anything, perhaps it ought to be in younger, talented staffs.

and mobile. They like their media with attitude and lots of point-of-view. They especially like media that is full of informality and self-mockery – the much reviled *Beavis & Butt-head* being a classic example. Interactive media, from Nintendo to computer games to call-in talk shows – even channel zapping – is not a futuristic notion but the only kind of media they know, the kind they patronize and expect.

There's more.

Real investigative reporting, something few other media can do as effectively as newspapers, has almost vanished from mainstream media. Op-Ed pages are almost universally soporific. Papers are still astonishingly primitive graphically, many still running black-and-white photographs 24 hours after we saw the real events live and in color. Papers have clearly lost touch with much of the public on issues as diverse as race, crime, and political coverage. A Gallup Poll found that journalism ranks far below banks and cops in terms of public confidence – and that the number of people who rate journalists highly in terms of ethics and honesty has dropped from an already dismal 51 percent in 1985 to 22 percent in 1993.

The institutions of journalism seem in desperate need of some mechanism for re-

connecting with an alienated public, and they needn't transform themselves into online publications to do it. An e-mail address on every reporter's stories would help. And gain journalists countless news sources as well.

If newspapers are going to invest heavily in anything, perhaps it ought to be in younger, more talented, more diverse staffs. The newspaper industry fails to take into account the dreary toll corporatization and chain ownership – the great fears of online users – have taken on newspapers' voice, vibrancy, and relevance. Founded by hell-raisers, papers too often have been cautious, tepid, and pompous. A century ago, newspapers were markedly more opinionated, fractious, and provocative than the corporate chain-produced dailies of today. Newspapers are drunk on information highway coverage and gee-whiz stories about the Internet, and their readers have to be overdosing.

There's more to come.

Roger Fidler, director of new media development for Knight-Ridder, told the Newspapers and Telecommunications Opportunities conference last year that he's working on yet another futuristic fantasy: an electronic publication combining the traditional look of a paper with full-motion, full-color video and sound on a portable notebook-sized display. Newspapers somehow never seem at home with techno-hype or -fantasies. It's not in their history or tradition, not a natural part of their culture. They have always been at their finest rooting out, shaping, and helping us define the great issues of the day. And writing about and mirroring our lives closer to home.

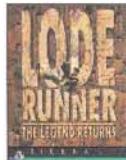
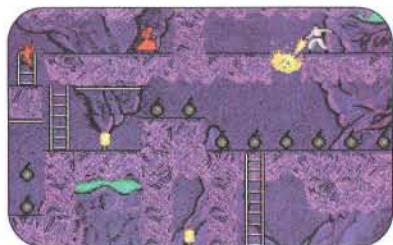
Maybe Fidler's tablet will work and help papers finally catch up. But it's hard to see why we need it or why Knight-Ridder wouldn't be better off hiring a couple of hundred bright young reporters instead. The answers to newspapers' problems might be much closer to home and much simpler.

"People have not stopped reading newspapers because of the latest high-tech gadgets," said Peter Thieriot, president of The Chronicle Publishing Company's newspaper division last year. "People have stopped reading newspapers because newspapers became less relevant." ■ ■ ■

Jon Katz (jkatz@aol.com) is media critic for New York Magazine. He has written widely about media and worked as an executive producer of the CBS Evening News. Of his three novels, the most recent is The Family Stalker (Doubleday).

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Fran-On-Demand



Wired visits one of the first interactive TV tests – in TCI's backyard in Colorado – and discovers that the only problem with the idea that movies-on-demand will drive the creation of the infobahn is, well, the demand.

By Evan I. Schwartz

This is the best job I've ever had," Fran says, with giddy enthusiasm.

Sporting shiny reddish hair, oversized eyeglasses, and a fresh pair of sneakers, Fran is the video-on-demand gopher for the sleepy burb of Littleton, Colorado, entrusted with keeping her eye on a big computer monitor hanging from the ceiling.

When an order for, say, *Coneheads*, comes in, she rushes to the giant videotape library on the far wall, retrieves the correct title, and hurries to insert it into the appropriate place in a gleaming bank of VCRs. During prime-time hours, two people share this job. But right now, on a Wednesday afternoon, it's all Fran.

Fran may or may not realize that her job category will

soon be phased out. Her employer, cable colossus Tele-Communications Inc. (TCI), is conducting this market test with AT&T and US West. But all the other interactive television trials just getting underway are powered by computers, not by people like her. This particular test, called VCTV (for Viewer-controlled Cable Television), happens to be decidedly low-tech. The only point of this trial is to gauge what consumers want – and what they will pay for when all the technology is ready.

Two and a half videos per month. That's the golden nugget of this entire market research effort. Since the VCTV test began in July 1993, the 300 households participating in the trial here in Littleton have each ordered, on average, between two and three movies every month. "That's twelve times the national average for regular pay-per-view," boasts Jeffrey Shomper, VCTV's marketing coordinator. He's comparing the finding with traditional pay-per-view, in which viewers dial an 800-number and order from a narrow choice of movies shown every hour or so. According to the *Pay TV Newsletter*, published by

Paul Kagan Associates Inc., the figure is only slightly lower than twelve times the national average, with typical households ordering just 3.5 movies per year.

To find this out, TCI, AT&T, and US West have chipped in more than US\$10 million.

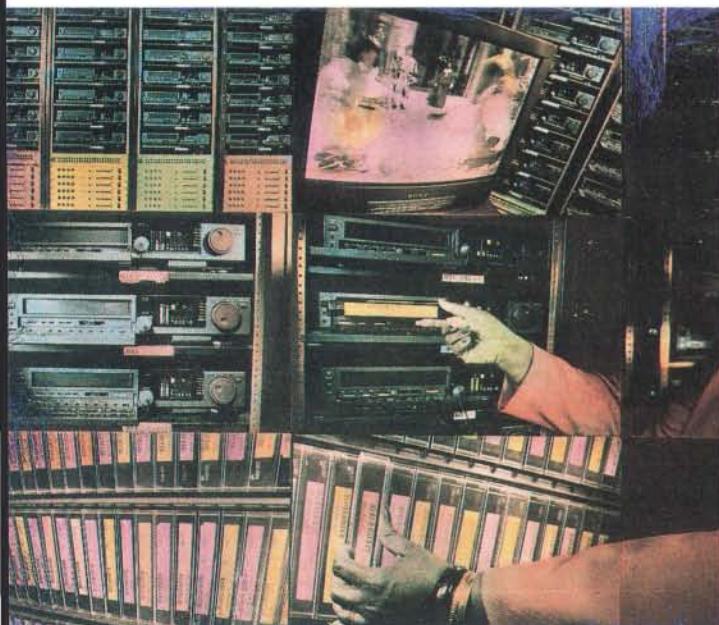
But considering how much these 300 families have been prodded, prompted, and probed, this 2.5-per-month figure is less than impressive. To recruit participants, VCTV sales reps went knocking on doors in Littleton on up to three separate occasions. If that wasn't enough, flurries of telemarketing calls and direct mail pieces with pictures of Kevin Costner were supposed to do the trick. And testers waived the monthly subscription fee for the purposes of the market test. Viewers only pay on a per-movie basis, usually about \$3 or \$4 a shot. Once 300 households accepted the service, they were also given three "barker" channels showing the trailers for the latest video releases around the clock. "We are hitting these customers pretty hard," says Shomper, in a bit of an understatement.

That's only the beginning of the interactive fun. Half of the participants' TVs are fitted with electronic Nielsen monitors allowing analysis of viewing decisions the families make; VCTV also tracks viewers' tastes using its own system. If someone shows a hankering for any of 19 different movie genres, the system takes note; those watching Westerns, for instance, immediately start getting hit with direct mail touting all the John Wayne, Clint Eastwood, and Gene Autry movies they could bear.

Market research purists might call this "polluting the experiment." No market-driven company in its right mind is going to spend this much money and effort recruiting and tormenting millions of customers. In the real world, the average household might never want to order 2.5 movies per month with a remote control. And even if it did, would that generate sufficient revenue to build an entirely new, digital, interactive television infrastructure?

That is one of the cable industry's most persistent and vexing questions.

Watching any movie, any time – *video-on-demand* – is supposed to be the killer app that propels dozens of new interactive TV services into American homes by the end of the century. The home shopping, the custom news programs, the play-along game shows, the dozen or so simultaneous football games, the home banking, the on-demand *Roseanne*, the whole 500-channel scenario that cable companies have been hyping – all of this is sup-



Never before has so much investment and hype and ingenuity gone into such a trivial task as replacing the video store.

posed to piggyback on the raging success of movies-on-demand. But there's one glitch: there's not much demand for movies-on-demand.

No matter. Market leaders are charging ahead, the less-than-stellar results from TCI's test notwithstanding. The trials by Time Warner in Orlando, Florida; by Cox Communications in Omaha, Nebraska; by Bell Atlantic in Alexandria, Virginia; by AT&T and Viacom in Castro Valley, California; and by TCI and Microsoft in Seattle are all set to start by early 1995. All of these companies have developed unique ways to replace Fran — they scan thousands of films into digital format and load them onto massively parallel computers. These video "server" machines will be linked by fiber-optic and coaxial cable to the newfangled set-top boxes on the TV sets in the homes of test customers.

Meanwhile, all these companies are aware of an extreme version of the 80-20 rule. It's not as if 80 percent of the viewers want to watch 20 percent of the thousands of titles that are available. It's more like 95 percent of the viewers want to watch the same five

movies at any given time. That's just the way the industry works. When *Mrs. Doubtfire* is released on video, almost everyone wants it that evening.

Computer scientists have tried to come up with a way to accommodate this requirement. The goal is to allow as many as 10,000 people to watch the same copy of a popular

Households will have to order a lot more than 2.5 movies a month for cable companies to break even on this stuff.

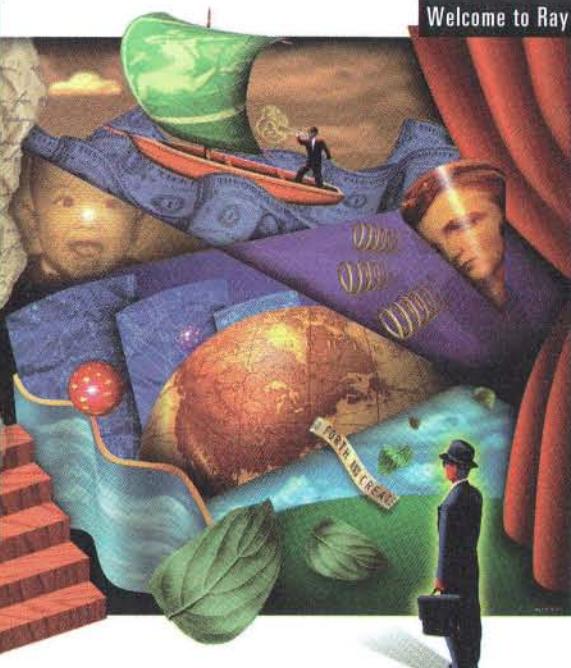
movie at 10,000 different start times. Just as on conventional TV or in theaters, movies stored on computers must be shown at a rate of 30 frames per second. Because the computer can grab the video at rates up to 240 frames per second, in any given second eight viewers can access the same portion of the memory.

But eight is not enough, especially when *Jurassic Park* comes out on video. A tech-

nique called "memory striping" increases viewership by chopping up each movie into, perhaps, a thousand small snippets. And each snippet is automatically placed on a different portion of the memory. This way, eight thousand viewers can simultaneously watch the same small segment of a movie. When a viewer finishes with a given snippet, special software knows how to jump seamlessly to the next one, keeping the movie on track. The software could even let viewers rewind, fast-forward, and pause the video, as with a VCR.

This all works in laboratories at least. No one has shown that this can work for a large group of fussy viewers. And even if the technology can operate as planned, there are basic limitations built into it. A single video server can handle the viewing demands of about 30,000 households, according to Ben Linder, director of technical marketing for Oracle Corp.'s Media Server software. Oracle is supplying video database technology to Bell Atlantic and other companies conducting trials. The software giant impressed cable companies earlier this year with claims that it could supply the technology for approximately \$500 per household. Some industry

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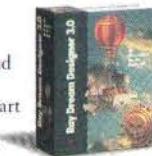
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analysts don't believe it. Taking all the costs into account, many analysts estimate that it would cost \$30 million to set up a typical 30,000-home network (about \$1,000 per household). Time Warner's Orlando system, meanwhile, is reportedly costing \$5,000 per viewer. No matter whose figures you use, the conclusion is the same: households will have to spend a lot more than what it costs for 2.5 movies per month for cable companies to break even on this stuff in a reasonable amount of time.

The technology also has some stiff and obvious competition. The corner video store seems anything but an endangered species these days. Indeed, the video rental industry shows no sign of retreat. A full 80 percent of American homes have VCRs. In 1993, these households spent record sums, renting 3.2 billion videos – an average of nearly one per week. There are roughly 28,000 video stores in the US, each serving an average of about 2,600 families. Although Blockbuster and a few other chains have dominated the business press a lot, most of America's video stores are independently run. These mom-and-pop operations are an entrenched part

of neighborhoods all over the country.

Believe it or not, many people actually enjoy visiting them. And walking through a typical video store is actually a highly efficient way to search for what you want. Movies are all categorized and displayed in full color. When you select one and bring it home, you are actually transporting more

"Everybody is talking big," says one analyst. "But no one has proof that there will be enough demand to justify the costs."

than 100 Gbytes of data with you. Even if the new release that you want to see is out of stock, it's not that big a deal. Most people can wait a week or two. If it wasn't important to see something in the theaters, it isn't so important to see it the minute it hits the video stores.

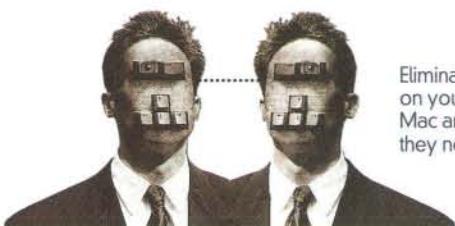
The inhabitants of Littleton seem to agree with this. Even during a particularly harsh winter, even with Fran-on-demand delivered

right to their living rooms, many of the 300 families in the VCTV trial *continued to go to video stores*. The market research showed only a slight decline in video store rentals among these families. Cable companies may yet build some sort of interactive infotainment superpipe. But they will probably have to come up with some other killer app, some other reason for people to subscribe to a new generation of cable services.

"Everybody is talking big," says one telecommunications analyst. "But no one has proof that there will be enough demand to justify the costs."

Never before has so much investment and hype and ingenuity gone into such a trivial task as replacing the video store. No one knows this better than Fran. When told she will be replaced by computers one day soon, Fran just shrugs and smiles, her eyes trained on a screen that, at the moment, shows not a single request. ■ ■ ■

Evan I. Schwartz (eis@murrow.tufts.edu) is a research fellow at the Edward R. Murrow Center for International Communications at Tufts University.



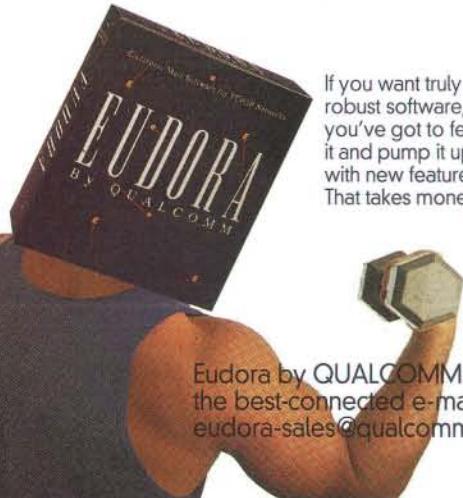
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David Versus Goliath



Little Microware has a rock called OS-9 in its sling as it takes on the giants in the battle to own the multimedia set-top box. By Stephen Jacobs

In case you hadn't noticed, everyone's talking interactive TV these days. Product trials, broken deals, mergers, start-ups – there's a rash of ploys to make your boob tube brilliant by hooking a computer to it. To many in this country, the word computer is still wedged to images of Silicon Valley and Microsoft, the company that strides the personal computing landscape like a Goliath. Chairman Bill Gates has said Microsoft is spending a cool US\$100 million a year on developing software for multimedia, interactive television, and the information

superhighway. The popular wisdom says that what Bill wants, Bill gets. Yet some of the hottest developments in software for interactive television are happening nowhere near Silicon Valley; they're happening thousands of miles away in the Midwest.

Des Moines, Iowa, is not the city that most of us would pick as the site of a burgeoning industry revolution. But then, Des Moines surprises.

Sure, it's a small Midwest town surrounded by flat and well-farmed land, but that's not all there is to it. There's a Thai restaurant whose zillion-page beer list boasts brews from all over the world. There's a monumental modern Civic Center whose concert hall hosts world-class guitarists. And there's Microware Systems Corporation, a 200-employee, privately held corporation that makes an operating system called OS-9.

Microware is headquartered in a 25,000-square-foot building just down the road from the offices of the National Pork Producer's Council. So far, it may not sound like anything to get excited about. OS-9 was created to control manufacturing and robotics applications. The latest addition to its product line, Digital Audio Video Interactive Decoder (DAVID), is a version of OS-9 for set-top terminals, the cable decoder boxes of interactive television.

DAVID is the program that runs "under the hood," the skeleton around which user interfaces will be built by manufacturers of the terminals. It must be a pretty impressive set of bones – it's been licensed to 15 manufacturers of set-top terminals for interactive television, including IBM, Philips, Zenith Corporation, Fujitsu, Mit-

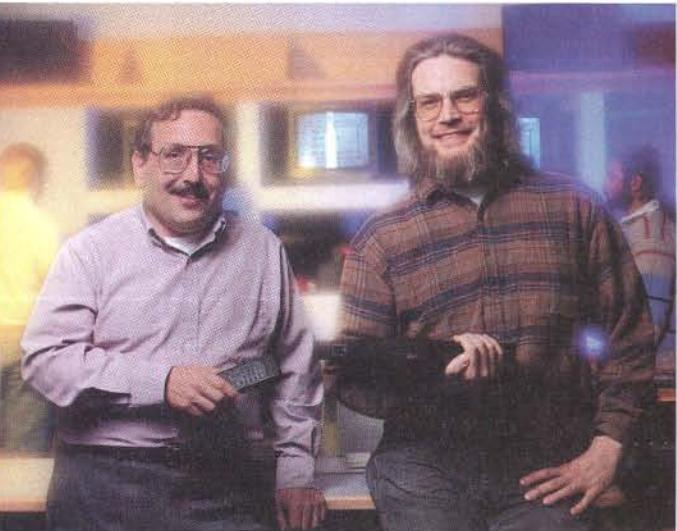
ubishi, Kyocera, GoldStar, Samsung, Adaptive MicroWare, Divicom, and EURODEC. By the time you read this, more will be on board. Oracle's media servers will communicate with these DAVID-based set-top boxes in Bell Atlantic interactive television trials in New Jersey and Northern Virginia. (A groundbreaking Federal Communications Commission decision in June cleared the way for Bell Atlantic to compete with cable in providing video programming in Tom's River, New Jersey.) Other announced interactive TV trials that are using DAVID include Nynex's Manhattan and Rhode Island trials; Cox Communications's trial in Omaha, Nebraska; Telecom Australia's system; and Hong Kong Telecom's system.

Though Microware's operating system was developed for manufacturing and process control, it also has been used in multimedia for some time. DAVID has its roots in the operating systems for Tandy's Color Computer 3 and Philips CD-I, which are versions of OS-9 with platform-specific modules. Even so, conventional wisdom puts a small, relatively unknown software company at a disadvantage against a major player like Microsoft.

Predictably, Microware President Ken Kaplan doesn't see it that way.

"I don't know what other people think, but I just don't think Microsoft's gonna be a player. I just think it's too late. We've been working on this for two, three years. We've got real product. By the time they figure out how to put Windows on a set-top box, we'll have a couple of million boxes out there and working. At least that's the plan," says Kaplan.

Since 1977, Microware has been developing ROMable (i.e., small enough to fit in the Read Only Memory chips on a system's motherboard) real-time operating systems, and doing quite well, thank you. Microware began when, as Drake University students, Ken Kaplan and Larry Crane (vice president of advanced research) got a grant from the National Science Foundation to write software for first-generation microprocessors. They started with the Motorola 6800 – the precursor to the 68000 series of CPUs that would drive the Macintosh. This work led them to develop RT/68, a small, efficient multitasking operating system for industrial applications. Kaplan and Crane founded Microware to develop and sell RT/68, putting a small ad in *Byte* magazine. Orders began rolling in from around the world. Physicist Rudolf Keil at the University of Heidelberg used RT/68 to control lasers for physics research. More than an early user, Keil was one of the first Microware customers to begin working with the company. He ended up leaving the university to become Microware's German distributor.



Microware President Ken Kaplan, left, with Vice President Larry Crane. "I don't think Microsoft's going to be a player. It's just too late."

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Motorola was so pleased with RT/68 that in 1978 the company asked Microware to develop a Basic language for the 6809 processor, the bridge chip between the 6800 and Motorola's popular 68000 series. Microware began developing the Basic and an operating system to go with it. That was the beginning of OS-9. Kaplan and his team modeled OS-9's I/O and process handling after those in Unix, which at the time was a relatively unknown operating system. Microware's decision to use Unix as a model may have been a gamble then, but it has proved to be a fortuitous choice: Unix has since grown to become the lingua franca of the Internet. As a result, the OS-9 of a decade ago was more ready for the information superhighway than many other operating systems are today.

OS-9 is popular in industrial applications worldwide for robotics, telecommunications, or any other type of application that requires a small, on-board operating system to handle a large number of processes extremely quickly. The head of Microware's French office, Nick Rainey, ticked off several applications that have made OS-9 popular in Europe:

"CERN, the particle accelerator; the French pay-phone systems that now run off

'smart cards' – that's OS-9; British Telecom; subway systems. I had a big surprise when I went to open the Russian office. They took me over to see the space flight simulators, and they'd been running the whole system off a version of OS-9 that they'd bootlegged from some Germans somewhere. They were really glad to see us!"

OS-9 made early inroads in Japan, when Fujitsu made 6809-based personal, multi-

Those in the [interactive TV] industry don't want monopolists dominating their business.

tasking computers for the Japanese market. In the US, OS-9 can be found in NASA simulators as well. Flight simulators, maintenance, and testing equipment for McDonnell-Douglas, Lockheed, and Boeing also run off of OS-9. Microware's sales are pretty well divided into thirds between the US, Europe, and the Pacific Rim.

Coming into view

Microware seemed to burst into public view from nowhere when Bell Atlantic announced

specifications for its interactive services in January 1994. The specs could only be met by terminals running DAVID. This was a surprise, as Bell Atlantic had released a preliminary set of specs several months before that appeared to be based on Modular Windows, Microsoft's now-dead operating system for multimedia. In reaction to the Bell Atlantic announcement, the January 18 *Wall Street Journal* ran a feature story about Microware. Since then, Kaplan and company have been signing set-top box contracts right and left.

Modular Windows is kind of a mystery. Apparently, it was to have been a smaller, faster, trimmer version of the Windows operating system for set-top boxes. It has been replaced by a new system from Microsoft called Tiger. The *Wall Street Journal* piece left the impression that Bell Atlantic ran DAVID and Modular Windows in competition and chose Microware over Microsoft.

Not true, says Microware's multimedia marketing manager Arthur Orduña. "We didn't go head-to-head with Modular Windows because there was nothing to go head-to-head with."

Orduña says Bell Atlantic asked Microware to assemble an OS-9 comparison chart,

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something that would list the specifications and merits of several different operating systems. Microware was unable to obtain the information it needed on Modular Windows.

"First I called Microsoft directly, and all I could get was 'Give us your number and we'll call you back.' Then we asked a friend of ours to call Microsoft as a developer and ask about Modular Windows, the normal sort of playacting shit we get from our competitors. What our friend got for an answer was 'Well ... give us all the specs and information about the system you're developing and we'll call you back.'

Microware struggled to find someone who knew or would talk about Modular Windows. They finally found a source at Tandy, where Modular Windows was being used in the development of a home entertainment system prototype. (Microsoft wouldn't talk about it with *Wired*, either, but at press time has just announced its Tiger database for interactive set-top boxes.)

"We talked to this technician who worked on their interactive project," says Orduña. "He really didn't have specs either, but he bitched and bitched about the integration process and how difficult it was to implement Modular Windows on a consumer platform. So I called back the project manager at Bell Atlantic and told him 'I'm faxing you back this OS-9 comparison chart, and I really have to apologize beforehand for the gaping holes in there on the Modular Windows part because we don't know them. But, we have the number of this engineer you can call, and he can give you some insight on what it's like to integrate Mod Windows on a consumer platform.' A couple days later they said, 'OK, you're it.'

As a corporate entity, Bell Atlantic didn't make an agreement with Microware or specify DAVID as the operating system for its set-top terminals. It merely published a set of specifications that only DAVID could meet. No deal has been cut between the two companies, allowing each to keep its freedom and avoiding any accusations of monopolistic or restrictive behavior on the part of Bell Atlantic.

Multimedia experts?

CERN and French smart cards may sound far removed from the world of home entertainment systems, but Microware got its foot in that door a long time ago. The company has been slowly building a presence in consumer electronics since the early '80s. That's when Tandy used OS-9 in the Radio Shack Color Computer, fondly

remembered by some as the CoCo 3.

"We did the original operating system for the Tandy Color Computer," says Kaplan. "We did a windowing GUI for that called Multi-view. So we always thought that OS-9 would be a good operating system for consumers. No one back in those days was thinking about multimedia."

What they were thinking about was game machines. In the mid-1980s Microsoft announced MSX (Microsoft Extended Basic), a product that was supposed to be an industry standard for computer/game machines like the Commodore 64 and the Atari 800. Microsoft worked with ASCII Corp. in Japan to push the standard to a consortium of manufacturers including Sony, Matsushita, and Yamaha. The plan was to introduce it in Japan and then bring the systems to the states. It was not successful. In January 1986 Microsoft announced its long-term commitment to CD-ROM development. By February 1986 Microsoft and ASCII Corp. had dissolved their relationship.

Meanwhile, Microware's work for Tandy brought the firm to the attention of Philips. Philips had made an early video game system called the Magnavox Odyssey and had asked Microware to collaborate on a new product – originally envisioned as a type of rack-mountable game system. (It eventually evolved into CD-I.) After evaluating systems from 60 other companies, Philips decided to ask Microware to develop CD-I's CD-RTOS, the operating system in every Philips CD-I System.

Microware got the CD-I contract in January 1986, and in the summer of 1986 Kaplan got a phone call from Silicon Valley. Bill Gates wanted to buy the company. Kaplan didn't want to sell but was willing to talk about joint ventures. Gates wasn't. The negotiations ended there before they had started, and Gates's picture earned a place of honor on Kaplan's dart board.

In the meantime, to support CD-I development, Microware formed two joint ventures in the interactive media field. The first is called OptImage. "Both Philips and Microware had to develop software and hardware to make discs," says Kaplan. "It's a chicken-and-egg problem. We needed to make discs to test our software, to test the prototypes. It wouldn't be a core business for either Philips or Microware, but somebody had to do it." Another Microware joint venture called MicroMall has been running CD-I-based shopping and information kiosks in several areas, including Chicago, as a preliminary step in designing shopping services for

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Why do set-top terminal companies want a robotics operating system for interactive television?

Most personal computing operating systems are large and relatively slow. They still don't effectively multi-task or run more than one application at a time. They take up a lot of hard-drive space and memory. The multitasking that systems like Windows and System 7 do is "cooperative." Different applications rarely stop or pause each other; they wait for breaks in CPU usage to have the computer change horses between them without shutting each other down. These systems are almost polite. They have response times of half a second at best.

In robotics or manufacturing systems, operating system needs differ. The scope of the operating system doesn't need to be as broad as that of a computer operating system, and often it must be able to fit into the system memory, right on the circuit board. True multitasking is vital. Different applications, or tasks, need to be able to interrupt each other, and quickly. A response time of half a second is much too slow.

"If a robot arm has reached its position, you probably need to tell it to do something immediate—

Why OS-9?

ly," says Peter Dibble, a research scientist for Microware. "You can't have it just waiting around while another task clears the screen."

Operating systems for set-top terminals must be compact enough not to need a lot of memory or a hard drive, in order to keep the cost of the box down. They must also be fast and multitasking. A half-second response time can give you frozen video or garbled audio.

"There are a lot of things going on in a set-top box at once," says Curt Schwaderer, a principal engineer at Microware. "First, you've got a networking front end that's sending data in at 1.544 Mbits per second. While all this networking stuff is trying to deal with (all this data coming in off the) T1, you've got another piece of the operating system that's taking the data and playing a movie with it. Then there's the third, interactive part, where you press buttons on a remote control. That requires more processing going on inside the box and more networking-type data going back and forth over the serial line so that you can do things like Fast-Forward, Rewind, Stop, Go Back."

OS-9 is modular so that it can fit a wide variety of

needs without taking up a lot of system resources. A modular operating system allows designers to pick exactly which parts they will need. The heart of the operating system, called a kernel, fits in only 29 Kbytes of chip memory. DAVID, which is just a specific mix of OS-9, networking, and video modules, will fit all the necessary parts for a set-top terminal OS into about 256 Kbytes of memory while running true multitasking, not cooperative multitasking.

Some set-top box manufacturers are waiting for the development of a video compression scheme more advanced than the current MPEG 1. Not Microware. The first DAVID set-top boxes will use systems that TCI initially passed on.

"I'd rather have something that works this year and see it get better later," says Microware's Dibble. "It would be fun to be able to deliver the set-top box that would start with HDTV and go on from there, the one that wouldn't deliver anything but quadraphonic sound and wouldn't work unless you had broadband fiber. Maybe that will happen. Maybe if we're lucky we will be the people still doing it because we were the ones who delivered the relatively not-so-wonderful stuff."

interactive television. The digital interactive "catalogs" at the heart of the systems use digital stills, audio, and video to display items from J C Penney, Land's End, and others.

Getting on the Net

While he was working with Philips on CD-I, Kaplan began hearing about another form of future multimedia delivery.

"Not long after we got involved with CD-I

and understood digital audio and digital video, it became clear that ultimately audio and video could be delivered by a network," says Kaplan. "Maybe it would be even better to deliver it via a network rather than via optical disk, but the transmission technology and the digital video compression weren't quite there yet. I remember back in '86 the Philips engineers said, 'There's a way to do it; we can't make the silicon yet, but in four or five

years we will.' So it was known back then that it was doable."

OS-9's popularity in the telephone-switching world had landed Microware on an advisory committee for Bell Atlantic. At about the same time that Philips was beginning to talk about digital video, the phone companies were talking about it as well. Bell Atlantic was starting to talk about sending digital video over copper wires. Bell Atlantic asked Microware if the OS-9 inventor wanted to participate in some of the research. About two years ago, Microware realized that if it combined OS-9 modules written for phone switching and telecommunications networking with the modules written for digital audio and video, they had all the parts of an operating system for set-top terminals. Soon after that, DAVID was born.

Driving a prototype

Recently, the folks from Microware have found themselves at a lot of trade shows to show off DAVID, either on their own or sharing booths with Oracle or set-top terminal manufacturers. If you walked into these booths, you'd see a demonstration of digital video on demand being driven by a DAVID set-top box talking to a video server. Additional DAVID networking protocols on the set-top box and the server would be handling the communications between the server's operating system and the DAVID system in the set-top terminal. Of course, all this is transparent to you. All you see is the interface designed by the set-top box manufacturer and the video delivered by the server.

At a recent demonstration in Des Moines, Microware used a Kyocera prototype set-top terminal. About the size of a standard cable decoder, the box came with one of those massive, 3,000-button multiremotes that are becoming standard in the consumer electronics industry. What wasn't standard were the cursor-control-style keys in one section of the remote. Those were the ones that drove the interactive part of the terminal.

The video was delivered by one of Microware's prototyping servers, through T1 lines to the local phone company offices several miles away in downtown Des Moines. The remote could perform VCR-type functions on the digitized video quickly and with no sync problems. The system responded instantly, much faster than a VCR. The only downside was the control of the "arrow pointer" via the remote: infrared doesn't seem to be the most effective communications channel between controller and

terminal, and scrolling up and down a screen is agonizing.

So what about Microsoft?

Since January there's been a lot of press about Microsoft's plans for interactive TV. From what's being said, Microsoft's model of a delivery system is similar to Microware's.

"We're looking at a switching broadband network," says Karl Buhl, marketing manager in advanced consumer technology for Microsoft. "We'd have four parts to the system: Tiger [Microsoft's current solution] continuous switching at the head end, coax from the head end to the home, a set-top terminal in the home, and a Microsoft software package running the system."

Conventional wisdom says Tiger will blow everything else away. Ken Kaplan doesn't buy it. "Microsoft is coming into this business from a standing start. No one wants them in this business anyway. They're not welcome."

"If Ken thinks we're not wanted here in the industry he should talk with TCI," Buhl counters. He says TCI's trials with Microsoft's Tiger technology will begin in Seattle at the end of the year. (See *Wired*'s interview with TCI head John Malone, *Wired* 2.07, page 86.)

Obviously, Kaplan thinks it's not too early to count Microsoft out. "Bill Gates says he's been spending hundreds of millions of dollars a year on this business," Kaplan reasons. "Do you know what kind of return he's got to get on that investment? There isn't that much money in set-top-box software, sorry. Microsoft wants to get a piece of everything, probably per transaction. The market can't afford that. It can't afford Microsoft, and those in the industry don't want monopolists dominating their business. Not to mention that Microsoft doesn't have a clue about this business. It's a TV-set business, not a computer business."

"This happened to them once before. They missed the boat totally on networking. That's why Novell took off. Bill didn't figure it out, he didn't see it coming. He didn't approach it right, and Novell came in and ate his lunch."

According to Microware's Orduña, DAVID was not just a lucky acronym choice. While the name's been trademarked, the logo hasn't been finalized. The first version of the DAVID logo followed the biblical metaphor right down to a sling. That got a thumbs down as taking the joke a bit too far. But if Microware *really* wants to get Microsoft's goat, maybe it'll choose a logo inspired by Novell. ■ ■ ■

Stephen Jacobs (sjnce@rit.edu) is a contributing editor for *Videomaker* magazine.

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Nerd Games

Each of them has always taken pride in being the **smartest guy in the room** – but hey, now they're all in the same room.

John Schwartz reports from this year's **Computer Bowl**, where the East evened the score.



There are few rooms in the known universe where lyrics like this – especially when accompanied by accordion – would go over: *Lady of Spain, I upload you/Send me your FAQ, I'll decode you....*

But then, let's be honest. That one even bombed here – but at least everyone in the audience *got the joke*. And they also knew that the gag wouldn't cost the laughmeister, David House, his day job as a top exec for Intel.

Because this was The Computer Bowl, an annual fund-raiser for The Computer Museum in Boston and one of the rare tribal gatherings for the computer industry's pioneers. The Bowl is patterned after the old College Bowl game

ishly proud and gloriously uncool. And rich, of course: since its inception in 1988, the Bowl, presented by the Association for Computing Machinery, has raised more than US\$4 million for the Museum.

"Ladies and gentlemen, hackers of all ages," says emcee Stewart Cheifet, host of the PBS show *Computer Chronicles*, introducing the bout. "It is the revenge of the nerds, the ultimate moment of geek glory!"

"Who knows more about computers?" Cheifet asks. "The people from the East Coast, who brought us mainframes and minicomputers? Or the people from the West Coast, who brought us silicon chips and personal computers?"

They were all *Wunderkinder* once, but many of them are now going gray. And several of the jaunty baseball-style T-shirts they've agreed to wear pull tight over spare tires.

So, while nobody's taking any of this seriously, and it's all for a good cause and everyone on stage is buddy-buddy, you can't help but feel the room tense up as Mitch Kapor and Bill Gates go head to head on a question. (You know the history, but here's the recap: Kapor, founder of Lotus Development Corp., walked away from the job in 1986 because the company had gotten too big and it just wasn't fun any more – in no small part, it was said, because Bill Gates and Microsoft had helped turn software into just another cutthroat business. Kapor went on to found the Electronic Frontier Foundation, fighting for civil liberties in cyberspace, while Bill Gates went on to amass more money than god. The people in the audience at the Bowl, of course, knew all of this and more.)

Questioner Andy Grove, the Intel CEO, asks the players to multiply 11 by 11 – in base 89. Kapor takes the bait, struggling for a moment, and answers: "It's going to be one, and whatever stands for 22." The judges say "No" and the crowd breaks up, but Kapor's wide-eyed shrug seems to say, "You do it, then." Gates can't resist: He buzzes. He gropes. "132."

Host Stewart Cheifet explains, "That's not the correct answer either. The correct answer is 121 because it's always 121 except for base 2."

Oh, yeah, right, murmurs the crowd. Grove smirks. "Obvious," he intones, shaking his head. Gates, however, successfully guessed the annual cost of the electricity required to run all the world's personal computers each year – \$4.6 billion. His math apparently gets better when he works with really big numbers.

Questions ranged from the obscure to the historical. What did computer pioneer Alan Turing do in the woods to guard against wartime inflation? (Buried two silver



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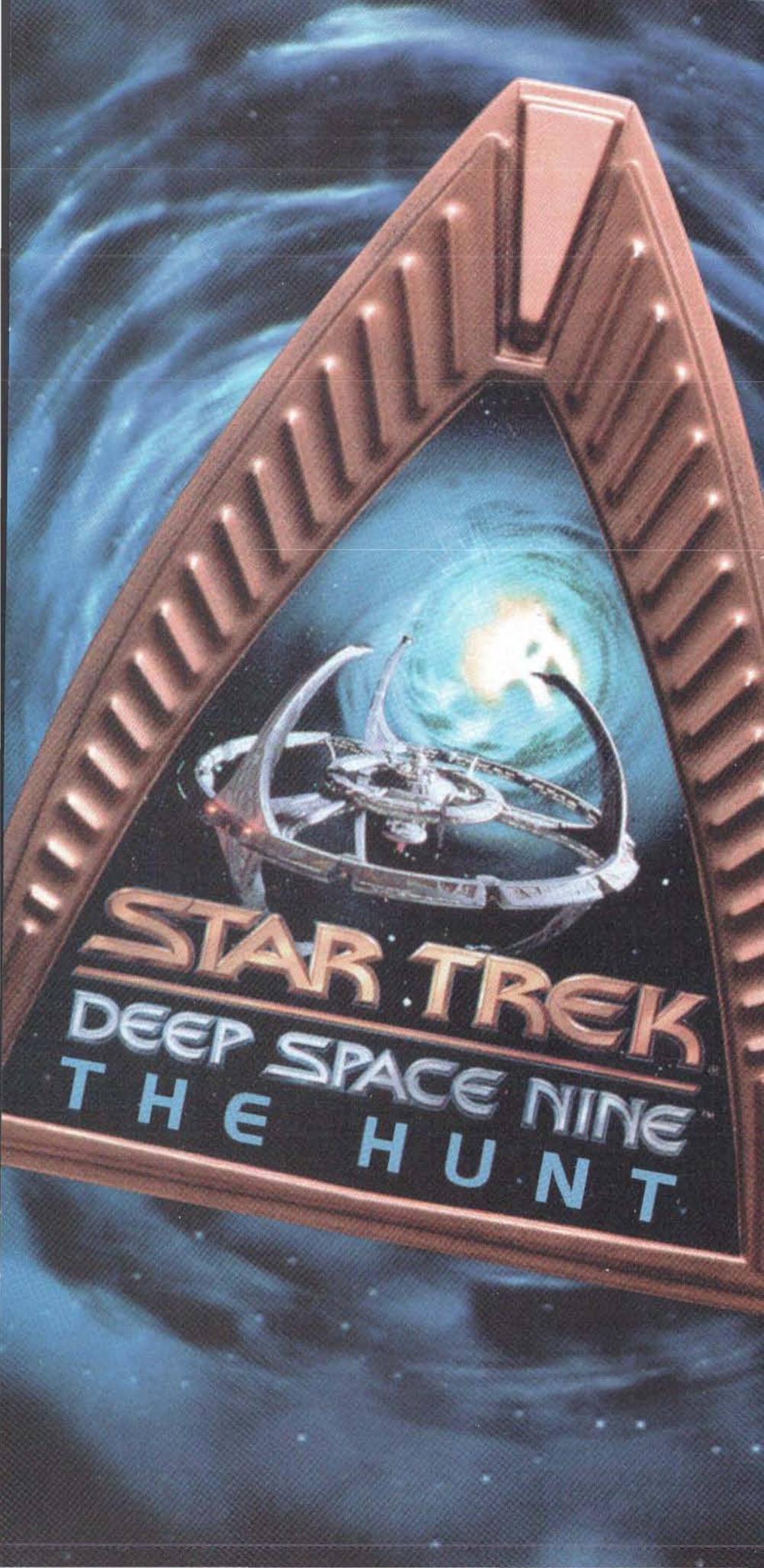
shows, but all of the questions are about computers. Which is as it should be, because these are the folks who made it all possible. You can call it a trivia contest if you like, but to these guys it's money in the bank. The players are drawn from the ranks of the industry's legends. Take Bob Frankston, the co-creator of VisiCalc, the first spreadsheet, and David Liddle, who runs Paul Allen's Interval Research but first made his mark as one of the smartest smart guys at Xerox PARC. Each of them has always taken pride in being the smartest guy in the room – but hey, now they're all in the same room.

The aforementioned room, of course, is appropriately done up. It's the San Jose Civic Auditorium, disguised as the inside of a huge PC – and, since the set was a borrowed Intel Comdex stage – featuring a prominently displayed Pentium chip. No wonder the auditorium seemed hot.

This year's event was the All-Star Game, a showdown for the top players from the previous five games. Those contests ended with three wins for the West Coast and two wins for the East; the East was out to even the score on the only battlefield that matters: nerd knowledge.

Imagine for a moment GE's John Welch putting on silly clothes to match wits with, say, Henry Kravis. No way.

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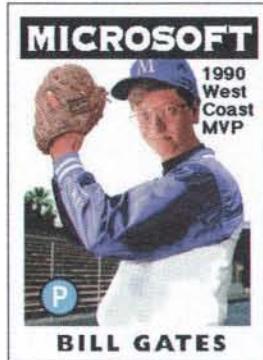
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ELECTROSPHERE



ingots.) How many buttons did Doug Engelbart's first mouse have? (Three.) Was the internal pre-release name of Borland's Quattro spreadsheet: 1) Buddha, 2) Rows and Columns, or 3) Spreadsheets R Us? (Buddha, based on Borland's pun (and hope) that Quattro would "assume the Lotus position.")

This bowl is more low-key than previous bouts – it is another time around for each player, after all – but still they tense at the buzzers, waiting to slap before some other millionaire can make a move. Liddle buzzes the moment he hears the letters "ATM," and blurts out the words "Asynchronous Transfer Mode" – but oooh! It's a sucker-punch: the question is actually about Automated Teller Machines.

At half time this year, the players leave the stage for a charity auction. The audience bids up to \$3,600 for a book of essays on Albert Einstein autographed by the scientist, while one of Kapor's old Hawaiian shirts pulls in \$1,500.

Then the bidding heads into the stratosphere. Gates has come to sit in the audience, and he gets into competition with Gordon Bell, the computing pioneer who developed the phenomenal VAX minicomputer for Digital Equipment Corp. The prize: being pub-

lisher for a week of *Computerworld*, the trade journal, and visiting one of the newspaper's offices around the world. With the combined skills of an auctioneer and a stand-up comic, Christie's auctioneer Ursula Hermacinski gets them up to \$28,000 before Gates drops out. (Later, at the after-dinner bash, Patrick McGovern, CEO of *Computerworld*'s corporate parent, offers Gates a week of his own on the condition that he match Bell's price. Gates agrees. It's cheaper than buying *Computerworld* outright, though of course he could do that, too, if he wanted.)

The last buzzer sounds, and the East takes it, 190-150, evening the ongoing battle, 3-3. The top scorers – Liddle and David Nelson, senior software consultant for Novell Multimedia – each receive one of the treasures of the Computer Museum: memory cores from MIT's original Whirlwind computer, the machine that began the museum's collection. The tiny metal donuts suspended in the lattice-work of wires are stunning works of techno-art: Liddle regards his with something like awe. All those zillionaires – they're just guys. He's holding history. ■ ■ ■

John Schwartz (jswartz@well.com) covers Science for the Washington Post.

More Computer Bowl questions

Supercomputers used for DNA sequencing played a major role in the movie *Jurassic Park*. What brand of supercomputers were used for DNA sequencing in the novel *Jurassic Park*?

Cray – though the more photogenic Thinking Machines appeared in the movie version.

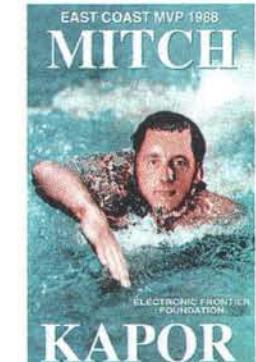
Where does the "Gopher" search software on the

Internet get its name?
The University of Minnesota's burrowing mascot.

What is Bill Clinton's Internet e-mail address?
president@whitehouse.gov.

What does the acronym "Sega" stand for?
Service Games.

Of the following, who does not wear earrings: Jean Louis-Gassee, Steven Wal-



Iach, or Philippe Kahn?
Kahn.

In what 1974 movie did George Segal have a computer implanted in his brain? *The Terminal Man*.

True or false: the US Department of Defense got permission from Ada Lovelace's descendants to use the name Ada for the high-level language? True.



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CamNet: Those Who Cam, Do

If you don't like TV, go out and make some of your own.



By Michael Goldberg

They have interviewed high school students who sell condoms (and fear AIDS) at Condomania, a trendy Melrose Avenue prophylactic store.

They have tagged along with John, the nude handyman, as he repaired a leaky faucet in his birthday suit.

They have videotaped the Church Ladies for Choice singing to the tune of Malvina Reynolds's "Little Boxes": "Psycho Christians, blocking health care, and they all look just the same; There's a white one and a white one

and a white one and a white one; Psycho Christians, blocking health care, and they all look just the same."

They have toured the Nixon Library, hung out with anti-nuke protesters in the Nevada desert, and aired previously unseen outtakes from Elvis's 1968 comeback special. They have

caught up with writer Paul Bowles in Tangiers and journeyed to Amsterdam to cover *High Times* magazine's official 1994 Cannabis Cup, a smoke-out where so much dope was consumed that one gets a contact high just watching the footage.

And, on a less humorous note, one of the far-flung video journalists (VJs, they call themselves, and they're not referring to Kennedy and her MTV brethren) interviewed students and parents in Kalkaska, Michigan, on the day that a public school was closed because the community vetoed, for the third time, a tax increase. One 59-year-old resident whose seven children (and several grandchildren) attended the Kalkaska schools admits with no apparent remorse, "I voted 'No' on every one of them."

They are CamNet, the Camcorder Network, and they want to liberate your TV screen.

Their video *vérité* offers a refreshing and badly needed dose of everyday people dealing with the joys, sorrows, highs, and lows of real life, in stark contrast to the blood-

and-guts video bites typically dished up by the blow-dried robots of network news.

Using mostly amateur, unpaid VJs scattered throughout the country who have Hi-8 camcorders and plenty of chutzpah, CamNet's founders and editors, Nancy Cain and Judith Binder, have been beaming their delightfully offbeat, often insightful, sometimes funny, always intelligent, frequently political, and genuinely entertaining documentary-style news shows out into a million or so American homes for the past two years.

It is the night of April Fools' Day, and Judith Binder is on assignment. Armed with a small Sony Hi-8 camcorder (see "How to Become a CamNet VJ," page 79), Binder is standing in the parking lot behind Mondo Video A-Go-Go in Hollywood, where a performance art troupe will soon begin its satiric *Crucifixion Carnival*, in which "The Miracle of the Bleeding Heart of San Moronus" will occur.

But first, as longhaired artsy types unload a cross – with a life-sized Jesus figure attached – from the back of a van, Binder has her camera trained on a self-described "rock singer/actor/alien" who calls himself Rocket Boy. Wearing a red beret and wild beard, he explains that he's currently acting in an underground film called *The Revenge of Big Foot*, in which he "goes to hell for raping and killing Big Foot's daughter." As Binder lets the videotape roll, documenting this craziness, she is assisted by actress Beth Lapides, a sometime CamNet correspondent who at the moment is deftly handling Rocket Boy's interrogation. "So, Rocket Boy, what's with the name?" wonders Lapides.

"It has to do with my five UFO experiences," Rocket Boy matter-of-factly replies.

"Oooh!" exclaims Lapides. Then, without a pause, she asks him to talk about his most recent one-on-one with these alleged space invaders. "They came down to me and asked me to help find a person, another alien actually, who had been kidnapped..."

And so it goes when you're out there, trying to break new ground, looking to show that slice of life that rarely makes it onto the TV screen.



Two weeks later, in the Venice Beach, California, cottage that houses Nancy Cain and serves as CamNet's base of operations, Cain explains that the only snippet expected to make it onto the screen from the *Crucifixion Carnival* is a 30-second bit featuring a young woman. The woman, playing the role of a "cheerleader for Jesus," goes through



CamNet's founders and editors, Judith Binder (left) and Nancy Cain have been beaming their delightfully offbeat, often insightful, genuinely entertaining shows out into a million or so homes for the past two years.

Many of the pieces CamNet airs are remarkably intimate. A prosthetic-breast manufacturer gives them a tour of the factory, then reveals that she herself wears prosthetic breasts. She even pulls a falsie out of her bra, as the camera rolls.

her routine yelling: "G-O-D God! Go God!" and thrusting blue-and-gold pompoms toward the sky.

"We might use that as a 'bumper,'" says Cain, referring to brief, evocative pieces of video - kids playing video games, two turtles fighting, a snail oozing through the grass, a little girl explaining why she doesn't like TV commercials - that are interspersed between CamNet's longer pieces.

Cain and Binder never go anywhere without their camcorders. Sometimes a tad spacey, sometimes highly focused, Nancy Cain has the look of a '60s anti-war protester, with her long, curly, slightly out-of-control hair and oversized jeans jacket. The look fits, though - in the late '60s Cain was part of Videofreex, a radical video group that shot

footage of Woodstock and the Chicago Seven.

Judith Binder is more uptown: styled reddish hair, black combat boots, jeans with appliquéd fish, and plastic snake earrings.

CamNet is their labor of love. Neither of the founders are paid, and often they have to supplement the advertising revenues that dribble in to keep their show on the air. To survive, Cain has taken on outside video-editing jobs, most recently working on infomercials. Binder, who is financially independent, does theatrical consulting and directing on the side.

Since going on the air in 1992, more than 40 hourlong CamNet shows have been broadcast.

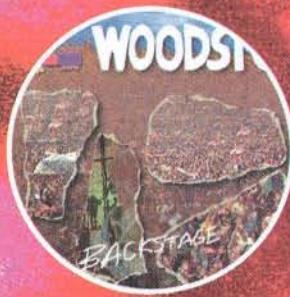
When asked why she devotes so much of her time to CamNet, Binder gets very quiet,

very serious. "It's my way of expressing myself," she says, adding that she believes the work is making a positive contribution to the community. "I feel I need to give service."

"We are the alternative network," says Cain proudly. "We give people the chance to communicate with each other using this vehicle, the camcorder. You don't have to be on the Internet; you can be on the CamNet."

While network news and CNN tend to report what could be considered the *official* version of the news, CamNet offers a down-to-earth, proletarian perspective. The VJs see themselves as video revolutionaries. Long before a home video of police beating Rodney King shook the nation, Cain and Binder understood both the power and revolutionary nature of the camcorder. No longer limited to

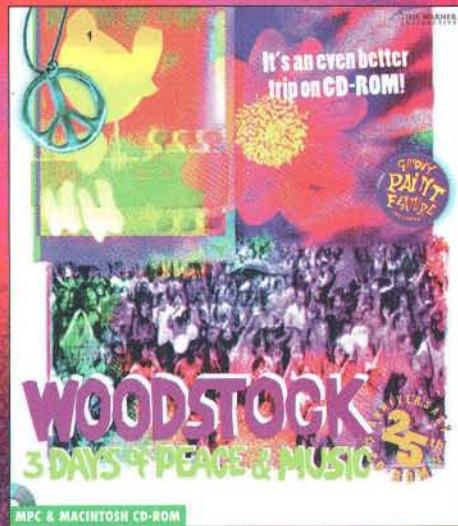
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media professionals, the camcorder today is nearly as omnipresent as the VCR. "Everyone pretty much has access to one," says Binder. "Either they own one, or they know somebody that has one."

In an MTV-world of quick cuts and trendy camera angles, CamNet pieces unfold slowly.

CamNet has interviewed high school students who sell condoms (and fear AIDS) at Condomania, a trendy Melrose Avenue prophylactic store. They have tagged along with John, the nude handyman, as he repaired a leaky faucet in his birthday suit.

CamNet VJs couldn't care less about slick; what they're after is emotional resonance. People are allowed to talk for more than just a sentence or two. To view CamNet is to look through a window into the real, dirty, unvarnished, and – in a sense – unedited world.

It's not The News, cautions Cain, but the *other* news.

Right now, CamNet is at something of a crossroads. In the two years it's been on the air, Cain and Binder have assembled a crack crew of VJs and managed to get national acclaim for a show put together on a true shoestring budget (US\$1,000 per on-the-air hour). But without a sales team to bring in

dream of the CamNet Channel – alternative news and features 24-hours a day.



With access to the tools of the trade, everyone is a potential VJ. Take correspondent Barbara Brownell, a teacher, actress, and mother living in North Hollywood, California. Brownell stumbled across CamNet while channel surfing and dug it so much she bought her own camcorder and became a regular contributor to CamNet. While anyone is a potential VJ, it takes practice to deliver footage that will satisfy the exacting and peculiar standards of Binder and Cain. "No talking heads," Binder says. "No anchorman-style narration. Just tell the story by showing it to us."

Many of the pieces they air are remarkably intimate. A prosthetic-breast manufacturer gives them a tour of the factory, then reveals that she herself wears prosthetic breasts. She even pulls a falsie out of her bra, as CamNet's camera rolls. "We don't have any three-man crews," says Cain. "One person with a little

serious advertising dollars, without savvy business brains to expand its audience, CamNet is a good idea in search of serious capitalization.

That hasn't stopped the two women from continuing to produce the show, but they have spent much of this year seriously pursuing Hollywood dollars that can fund their

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camcorder just isn't intimidating."

"They feel this is their chance to be heard," adds Binder, trying to explain the willingness of people they video to expose their humanity. "We're not confrontational. We're not there to confront them, we're there to hear them. I think people are starved to be heard. And most of the time, people are not being heard."

Though the pieces are often heavily edited – Cain and Binder can go through two hours or more of raw footage to pull together a five- or six-minute segment – the goal is to create seamless television. "If it looks like it's happening at the moment you're seeing it, if it looks like you're experiencing it live and you're inside it instead of outside it, then it works," says Cain.

"Like you're overhearing it – or, I should say, watching it – as it happens, as opposed to being told about it later," adds Binder.



Cain and Binder met in the fall of 1985 at the

Wallenboyd Theater in Los Angeles. Cain's husband, satirist (and publisher of *The Realist* since 1958) Paul Krassner, was performing his stand-up routine. By chance, they happened to be sitting near one another at a long table. Cain overheard Binder saying, "I have this little JVC camera and I can fit it into my bag ... and I have so many jobs and I don't even have time to do all of them."

"I turned to her and said, 'The first thing you have to do is raise your rates.' Which she still hasn't done," Cain laughs. "She said to me, 'What do you mean?' I said, 'Well I shoot with that same kind of camera.' 'You what?' It was a big shock. It was great. So that was a Saturday, and I think on Monday Judith came down here. At the time I had nothing in this place but a coffee table. We had to go somewhere else to look at each other's video."

"But I wasn't going to let her go," continues Binder. "I knew this was it!"

The two women discovered that each had been shooting video for years and that they shared the same fervor for the medium. Cain had first picked up a camera in 1969 while working as a producer at CBS-TV in New

York; she says that once she started shooting video in the field, she began daydreaming about a community-based video news channel. For a time, as part of Videofreex, Cain did broadcast home-grown video using a jury-built transmitter to her neighbors in upstate



New York. Binder was a housewife until the feminist movement of the '70s inspired her to pursue her interests in art and theater. In addition to directing alternative theater in LA, she turned to photography, and in the '80s to video, to document female artists.



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ELECTROSPHERE

Cain and Binder became good friends and business partners, helping each other out on any and all video jobs that came along. Then they got a lucky break. At the end of the '80s, two of Cain's longtime friends, Tom Weinberg and John Schwartz, started The '90s Channel in Boulder, Colorado. The '90s Channel



began by broadcasting independently produced documentaries in eight cities on United Artists Cable (now owned by Tele-Communications Inc.). At the same time, Weinberg and a number of his associates, including Nancy Cain, developed *The '90s*, a weekly hourlong alternative news and features show that primarily used camcorder footage.

Cain and Binder were hired as producers. *The '90s* went on the air in 1989 and ran for four seasons. For two seasons it was funded by PBS, aired on PBS affiliates, and seen in more than 100 markets. While working on *The '90s*, Cain and Binder put together a loose network of VJs. But in 1992, PBS canceled its support for *The '90s*. "That's PBS," says Cain with a shrug. "They never do what we want them to do. I don't know why they discontinued it."

Meanwhile, Cain says, *The '90s* Channel was "desperate for good programming." So instead of seeking out other staff TV jobs, Cain and Binder created CamNet, which gained instant access to the million or so homes that get *The '90s* Channel as part of their basic cable package.

Operating out of Cain's cottage, surrounded by editing equipment on loan from Weinberg (he eventually took the equipment back; CamNet currently trades ad space for editing time), Cain and Binder put the show together. Initially, they produced two two-hour shows each month. Each show was "looped" and broadcast continuously, 24 hours a day, for a week, on *The '90s* Channel. At the beginning of this year, they cut back to producing one hourlong show each month to free them up to capitalize and develop better distribution.

CamNet currently airs on *The '90s* Channel in ten localities: Los Angeles; suburban Denver; Baltimore; Detroit; Philadelphia; Vernon, Connecticut; Alameda, California; Scottsdale, Arizona; Shreveport, Louisiana; and Oakland County, Michigan. At press time, CamNet was also available via satellite on National Access

Fascinating video that doesn't cut it for longer
CamNet pieces is turned into "bumpers," interstitial programming between long segments. That's how these fighting turtles got on air.

Television (NATV) in the US, Canada, and Mexico.

"We share air with *Yoga With Lisa*, *Punk Wave*, and *Girls Girls Girls*," says Cain.

"That last one is suspect," smiles Binder.



Nancy Cain is doing her best to hold back the tears. As Cain, Binder, and I sit in the living room of Cain's cottage, just a block away from the craziness of the Venice Beach boardwalk, she is screening an extended piece on a woman who spends her days singing for spare change in New York's Christopher Street subway station.

The piece is powerful. The singer, a young woman from Alabama who is missing a few teeth, is a real talent, an Emmylou Harris of the streets. As she strums her electric guitar and sings James Taylor's sad ballad, "You Can Close Your Eyes," a drunk tries unsuccessfully to clap along in rhythm. For the most part, the singer is ignored by the New Yorkers hurrying onto the subway cars. At one point, when the camera leaves the singer to focus for a moment on the drunk, he snaps, "I told you don't put the fucking camera on me. You want to pay me, pay me!"

When she's done singing, the woman kneels before her open guitar case, counting the \$3 or \$4 contributed by passersby. Does she make much, she is asked. "Pretty good," she replies dispassionately.

"Something about that really gets to me no matter how many times I see it," says Cain.

"Sad, so sad," says Binder. "Her eyes."

"And her situation," says Cain.

Spend a few days with Cain and Binder, and it becomes clear that CamNet is not simply a job but a way of life. Actually, CamNet isn't a job at all. At the moment, they're running but one paid ad, for Phone Relief, a device that attaches to a telephone headset and allows for a hands-free phone conversation. "CamNet is absolutely an act of love," says Cain. "We've got to do this."

They've been actively pursuing financing from a major media company. They've "taken meetings" with executives from CBS Late Night, Fox, Time Warner, and others. They say an exec at Time Warner promised, "We're going to throw some money at you," but then wouldn't return their calls.

"They like it, but then they get scared," says Cain. "As I always say, if you want to be innovative, you have to be innovative. That's the problem."

But lately things have been looking up. In May they negotiated a deal with two veteran TV executives who hope to turn CamNet into a real business. The plan is for Cain and

Binder to spend a month in a top-of-the-line video suite (paid for by the execs) and put together a killer CamNet demo. Their new business partners intend to shop the show to medium-market network affiliate stations for broadcast during "fringe" hours.

The two women are hopeful that before long they'll have the resources to air a 30-minute version of CamNet daily. Still, if things fall through, they'll continue on their own, self-financing CamNet and airing it through their current outlets. "The more the Hollywood execs say 'No,' the more determined we are," says Cain. "For every deal that doesn't happen, it just makes us more determined, *goddamn it!*" ■ ■ ■

Individuals interested in buying copies of CamNet shows can do so for \$20 from CamNet. Call +1 (310) 399 3775 or write to CamNet, P. O. Box 2757, Venice, California 90294.

Michael Goldberg (insider@netcom.com) is a regular contributor to Wired; he interviewed Strauss Zelnick in issue 2.06.

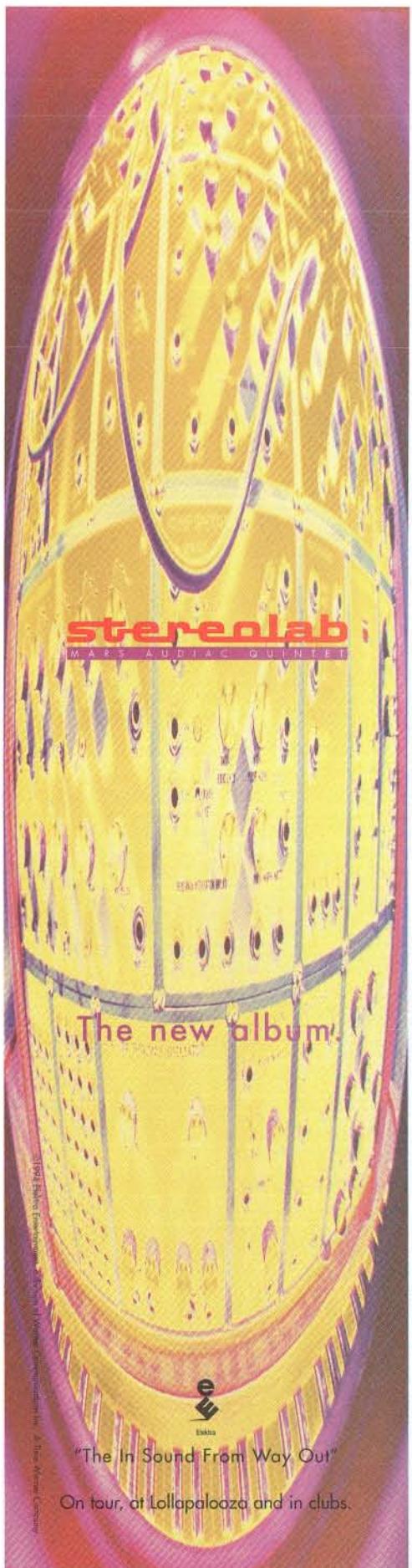
How to Become a CamNet VJ

CamNet is looking for volunteer VJs (there's no money in it yet). If you think you've got what it takes you can reach CamNet at +1 (310) 399 3775. If you want to submit something you've already shot, send a VHS copy, not the original, to CamNet, P. O. Box 2757, Venice, California 90294, along with a self-addressed envelope with postage if you want the tape returned.

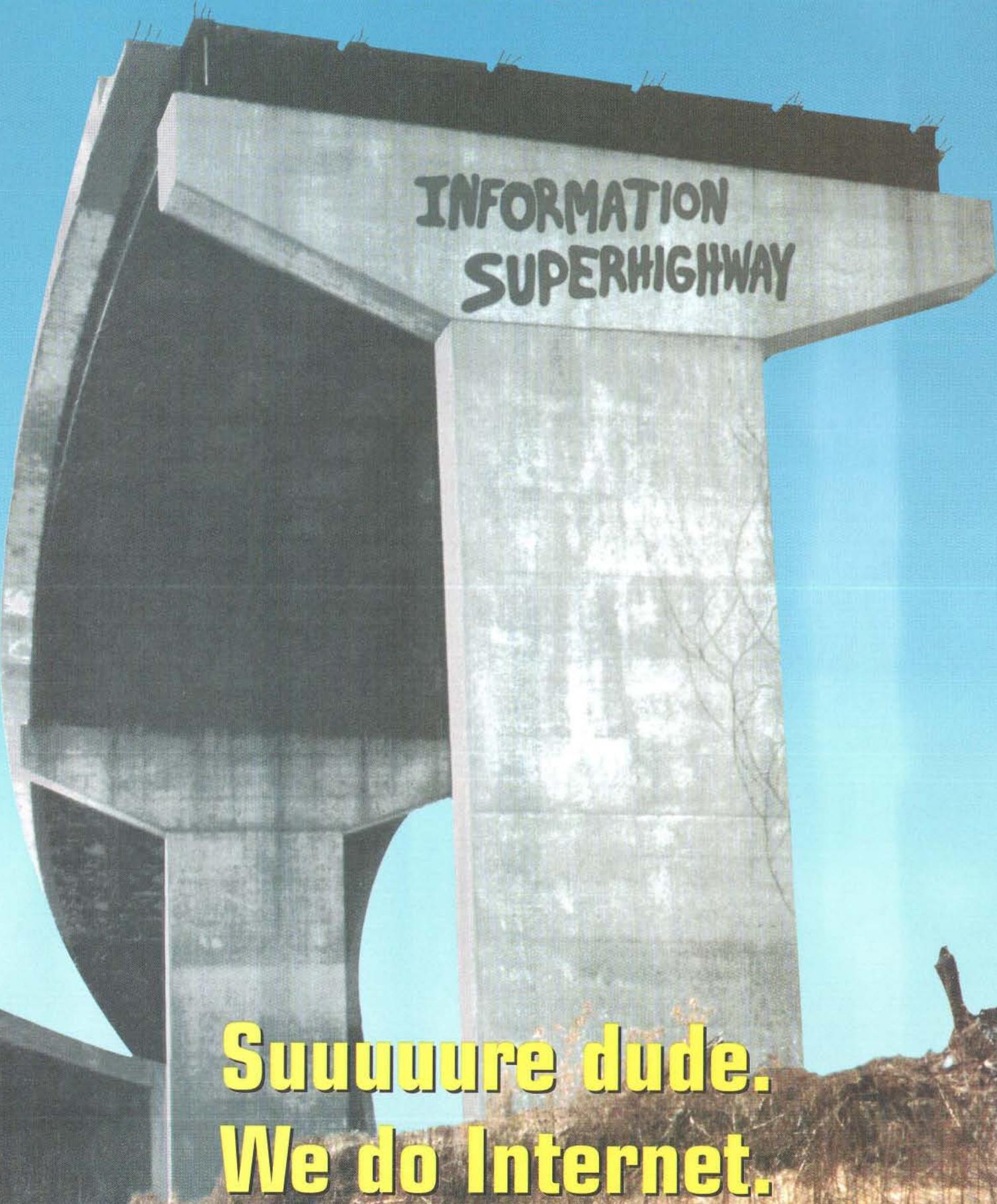
Binder and Cain insist that they look at everything and will offer feedback.

CamNet Rules:

- 1) Use a Hi-8 camcorder.
- 2) Bring along plenty of high-quality Hi-8 tape (Fuji is recommended).
- 3) Bring two extra fully charged two-hour camcorder batteries.
- 4) Buy an external, directional microphone (available for less than \$100) and attach that to your camcorder. The built-in microphone doesn't cut it.
- 5) Wear a stereo headset (available for \$3 or so) and monitor the sound as you are shooting.
- 6) Keep your lens as wide as possible; avoid zooming in on your subject. If you want to get closer, physically move towards your subject.
- 7) Keep shooting! Videotape is cheap. Keep the camera running, even if nothing is happening. Chances are, as soon as you shut it off, something will happen.
- 8) No tripods.
- 9) No talking heads.
- 10) Follow these simple rules and CamNet will be happy with your tape.



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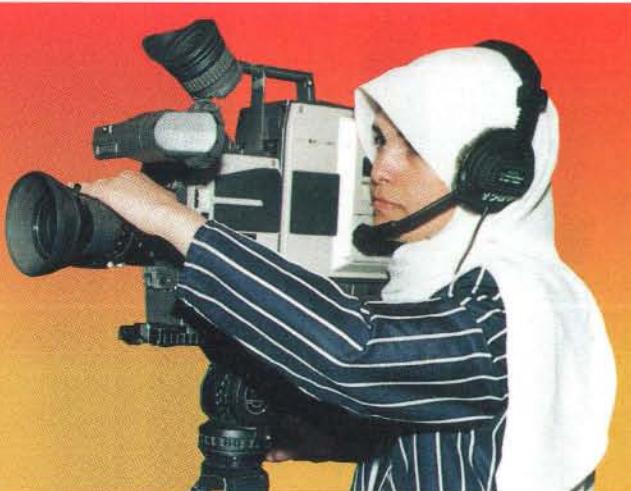
The medium is the message.



By Rich Zahradnik

Through the centuries, the American Colony Hotel, like Jerusalem itself, has seen many lives: the building started out as a pasha's palace, with a wing for each wife. In 1881 a break-away group of American Protestants bought it and established a religious community there. In the years since it became a hotel, it has served as a meeting place for journalist and source, diplomat and go-between, Israeli and Palestinian. Across a divided city, people come to meet at the American Colony. Cool stone floors lead through stone archways to the dining room. You half expect your waiter to whisper some key bit of intrigue.

But today the waiters are taking orders for coffee, and the meeting isn't about dramatic secrets, it's about television – Palestinian television. Daoud Kuttab – producer, journalist, and president of the Jerusalem Film Institute – is explaining how the peace agreement between Israel and the Palestinian Liberation Organization



"We are in a unique situation. We will have television before we have a state."

will lead to the creation of a Palestinian TV station. If the process can avoid the almost inevitable hitches, a Palestinian station could sign on sometime this fall.

The right to broadcast may not be as fundamental as the right to vote or the right to create a Palestinian-run police force, but the people of the occupied territories are already debating the type of broadcasting service they want. Their debate over issues of press freedom and media diversity reflects a nation struggling to define itself.

"We are in a unique situation," says Kuttab. "We will have television before we have a state, so people like myself who are more independent-minded, rather than state-minded or government-minded, have an opportunity to influence it in one way or the other.... We are really getting into this whole issue of broadcasting cold turkey. We have no traditions, no laws, very few professionals."

And a great deal at stake.

As Kuttab says, Palestinian TV will débüt before there is a Palestinian state, even before elections for the government that will run the Gaza Strip and the city of Jericho. It must, because everyone involved expects TV and radio to play a critical role in those elections. The new broadcasting outlet will shape the future state before it

exists; those seeking to run Jericho and Gaza will want maximum influence over the station. Add demands by some in the Palestinian community – tired of years of military censorship – for diversity, coupled with a feeling that their own cultural identity has been crushed by the Israeli occupation, and you get the idea this little TV station will be pulled by massive forces. It will be the only station the Palestinians will get for a long while, because of the scarcity of frequencies and the absence of cable TV in such poor areas.

How free will it be? The Israelis control the frequencies, at least until the Palestinians have an independent state. So the Israelis could shut the station down, though that would certainly damage the peace process.

The Israeli government won't be the station's only worry. Within the Palestinian community are some who want the new government to have direct control over the station. But the Palestinian audience itself will work against any attempt to impose heavy-handed controls on the new station. Palestinians live in a sea of frequencies – amid Israeli, Egyptian, and Jordanian TV and radio, not to mention satellite channels from all over the place – and they won't be receptive to the kind of state-controlled television offered in other Arab nations.

"You can't fool them very easily; they watch Israeli television with a very careful eye and ear," says Kuttab. "We are in a fight to get away from the existing Arab models, which are just completely useless."

Kuttab's criticisms of neighboring broadcasters aren't quite echoed by those named to run the new station: executives at the Palestinian Broadcasting Corporation are politic about channels controlled by those governments long supportive of the Palestinian cause. When presenting news stories, "we will always take into consideration the other opinion, to guarantee or make sure there is always a diversity of opinion," says Sam'an Khoury, deputy director general for external and public relations at PBC.

But the commitment to freedom and diversity at PBC remains open to question. Radwan Abu Ayyash, director general of the PBC and Khoury's boss, gave an ominous address in January, insisting the new station must be under the direct control of the Palestinian authorities. "This institution is one of the main pillars for the building of an independent Palestinian state," he told a conference in Jerusalem. "It is deeply connected with the Palestinian National Authority and reflects its policies and natural guidance. In order to save this institution from any attempts at political or financial intervention, irrespective of its source, which could affect its national goals, this institution must be a public national trust

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Ayyash spoke at "Palestinian Broadcasting: Promises and Challenges," the first ever meeting on the subject, held in Jerusalem under the auspices of the Jerusalem Film Institute and InterNews, an international journalistic organization. But a vocal group of Palestinians, including Kuttab, believes in creating a Palestinian state that is *not* modeled on the surrounding Arab nations. Topping the list is Hanan Ashrawi, former Palestinian peace negotiator and now head of the independent Palestinian Committee for Citizens' Rights. "Maybe we should ask ourselves two questions," she argued. "Do we want to be a replica of some existing Third World countries or some Arab countries who view the media as a tool of authority in a monolithic society? This tends to be repressive, autocratic, where every television station is surrounded by the army or the police for fear of the next coup d'état, where television or radio is the mouthpiece of authority, and opposition is stifled.... Or do we want to be pacesetters? Do we want to be models for a forward-looking contemporary state that is confident in the fact that the, if you wish, clash of ideas, confrontation of ideas, or debate and internal disagreements are a source of confidence and enrichment of the overall Palestinian expression?"

The conference brought in journalists from around the world and produced a series of recommendations. Palestinian participants called for "clear provisions for freedom of opinion, expression, publishing, and broadcasting" in the Palestinian constitution and "the continuation of our Palestinian tradition, which has refused, during the years of occupation, any form of political censorship."

Today, change is evident, though it remains difficult to determine how deep it goes. Perhaps Abu Ayyash overstated his case back in January. Perhaps there never was a united position among those working to set up Palestinian broadcasting. Or perhaps the conference itself had an impact. After the conference, the PBC adopted its current name, dropping its previous title of Palestinian Broadcasting Authority, to reflect the fact that "it is semi-official, and it has to serve all the public," according to Khoury. PBC will be governed by an 11-member board of directors, three or four of whom will be elected by a larger, 72-member board of trustees drawn from the community. The balance of the directors will be selected by the national authority with the involvement of the PLO.

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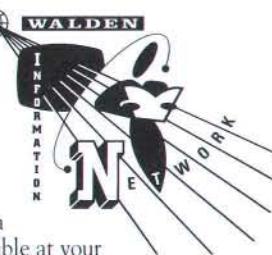
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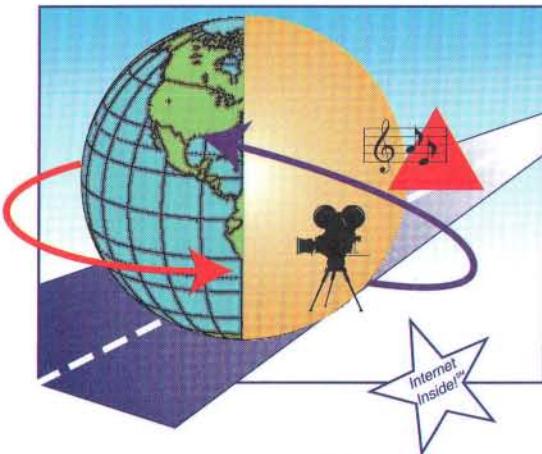
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That may sound ominous, but remember: the British government chooses the *entire* BBC board of governors. Adds Khoury, "We have written down very clearly that we would like to see freedom of the press, freedom of broadcasting, including the idea of more than one station in the future.... We, as people who fought for quite a long time against military and political censorship, have made it clear we are against any sort of censorship."

At least for now, PBC wants to offer opposition viewpoints and the widest range of opinions. It will have to walk a fine line in a community riven by Yasser Arafat's decision to seek peace. Islamic fundamentalist groups like Hamas have sworn to destabilize the peace process, as have right-wing Jewish settlers. PBC – new, underfunded, and untested in the face of laws and regulations – will face conditions that would try an ABC or a BBC.

The one wild card not being addressed by any of the players is Israeli censorship. Since the Palestinians will be using Israeli frequencies, Israel could pull the plug if it opposes what is being broadcast. Yet no one seems willing to name how, or if, the Israelis might attempt to censor PBC. Israel's ministry of

communications says it is negotiating with the Palestinians only on professional issues – that is, frequencies – not on political issues. The negotiation of political issues is, at least for the moment, reserved for politicians and, ultimately, the army.

Khoury insists that once a deal is made between the PLO and Israel, it is the laws of the Palestinian National Authority he must

Do we want to replicate Arab countries who view the media as a tool of authority? Or do we want to be pacesetters?"

worry about. Under the agreement, the frequencies "become ours unless the whole agreement falls apart. It's not a license from Israel to operate a station; it's part of the agreement, so the frequency will be ours. We are very serious about the peace accords. They're going to work hard to have them implemented, to have them work all the way through." Some form of voluntary censorship will have to be set up, since Israel could switch off the station if it likes, claims Kuttar.

"I know the PLO won't use it to incite violence," he says. "They will use it for Palestinian nationalism, and this will not make the Israelis happy."

The debate over political control will continue, but, for PBC, there are a host of nuts-and-bolts broadcasting issues to settle, issues of frequencies, sign-on dates, programming schedules and equipment purchases. The Israeli/PLO agreement gives the PBC frequencies for one VHF television station and one AM radio station. Specific frequency numbers have been identified for the radio station but not for the TV station. PBC already has commitments for hardware and operational support from the European Union, public broadcaster France 2, and UNESCO. An Ecu 2 million contract has been awarded by the European Union to a French company for the transmitters PBC will need. France 2, under an agreement between the French government and the PLO, will provide engineering, administrative support, and training; UNESCO has promised US\$500,000 toward the effort. Thanks to the aid, PBC already owns an outside broadcast van. But it's still in Paris and can't be moved to Israel lest it become a target for right-wing settlers.

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Dewdrops in the Garden

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Dewdrops in the Garden

(What better thing to blow up than the symbol of the Palestinians' new freedom to broadcast?) As a result, six Palestinians have had to fly to Paris to train. When PBC will be able to take possession of the equipment is still up in the air.

PBC television's initial programming schedule will run 3½ to 4 hours a day, with a half-hour news show in Arabic and three 5-minute news bulletins in Hebrew, English, and French, according to Khoury. Up to 2½ hours will be devoted to local programming focusing on industry, agriculture, education, and "promoting the idea of elections." The final hour or so will be made up of Arabic films — likely from Egypt, the film capital of the Arab world — and entertainment series, including American shows, to be acquired on the international market. Khoury views his audience as the 2 million Palestinians in the occupied territories and the 1 million Arabs living in Israel proper.

Back at the American Colony Hotel, Daoud Kuttab describes how TV is already beginning to reach across divides in the Middle East. He is the first Palestinian producer to co-produce a TV series with an Israeli company for Israeli TV. His Thania Productions, together with AmythOS TV & Film Productions, is making *Peace Chronicles*, a series of video diaries that will show how three Israeli and three Palestinian families lived through and reacted to the peace process. Israel's Channel 2 will air it, and it has been acquired by stations in Britain, Holland, France, and Canada. Kuttab hopes it will also premiere on PBC's new station.

Such street-smart, from-the-people production techniques will have broad application when the era of Palestinian broadcasting begins. Kuttab says he'd prefer to see 20 programs shot on low-grade VHS rather than 10 on Super Beta, because a "lowering" of broadcasting standards will allow more local productions to get on the air. His greatest hope is that PBC television will create a production center capable of providing programming for the 200 million people who live in the Arab world. For that, PBC needs to be free. "The openness we are campaigning for could make this a very good place for Arab TV and filmmaking," Kuttab says. "I have dreams that the Palestinian area can become a kind of base for pan-Arab television and filmmaking." ■ ■ ■

Rich Zahradnik (100155.530@compuserve.com) is editor of *Television Business International* and a freelance writer.

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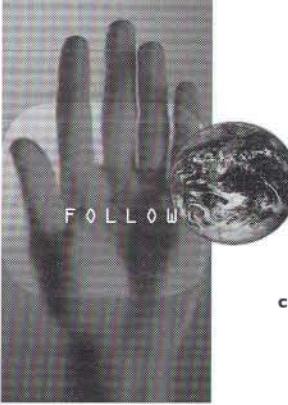
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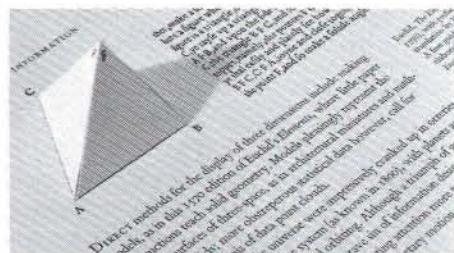
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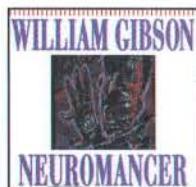
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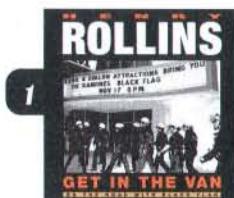
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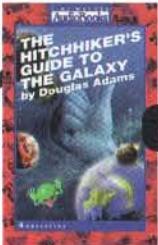
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bits. While those who produce electronic goods must expend the same capital, labor, and knowledge as those producing tangible goods, their products can be copied in nanoseconds and transported at the speed of light.

The hard-to-copy nature of tangible goods made the traditional pay-per-copy mechanism a natural choice. But an info product's ease of duplication so thoroughly undercuts the traditional notion of pay-per-copy that the possibility of an abundant supply of pre-fabricated information-age goods is nearly nixed.

But imagine a significantly altered market mechanism for electronic goods. Instead of treating ease-of-replication as a liability to be prevented – via labor-intensive copy protection and legal or moral restrictions – this new model treats ease-of-replication as the asset upon which a new foundation for software engineering could be based. In Japan this new way is called superdistribution. Superdistribution lets information flow freely, without resistance. Eschewing the low-tech property-rights mechanisms already widespread (shrinkwrap software, license servers, dongles, demoware, shareware), superdistribution allows miners, refiners, fabricators, assemblers, distributors, and marketers to cooperate and compete as producers and consumers of electronic goods within a global information-age society.

Existing copyright law distinguishes between copyright (the right to copy or distribute) and useright (the right to "perform," or to use a copy once obtained). In the eyes of the law, when Joe Sixpack buys a record or CD at a store, he's actually purchasing a *bundle* of rights that includes ownership of a physical medium along with a limited useright that allows use of the music on that medium only for personal enjoyment. Large television and radio companies buy an entirely different bundle of rights. They often have the same media (whose only difference is a "not for resale" sticker on the cover) thrust upon them for free by publishing companies in expectation of substantial fees for the useright to play the music on the air. These fees are administered by ASCAP (American Society of Composers, Authors and Publishers) and BMI (Broadcast Musicians Institute), who monitor how often each record is broadcast to how large a listening audience.

Similarly, superdistribution treats each personal comput-

er as a broadcasting station whose "audience" consists of a single "listener." First pioneered in 1987 by Ryoichi Mori, head of the Japan Electronics Industry Development Association, superdistribution is based on the observation that electronic objects are fundamentally unable to monitor their own copying but trivially able to monitor their use. For example, making software – whether it's Microsoft's Word or Mike's string-compare subroutine – count how many times it has been invoked is easy, but making it count how many times it has been copied is much more difficult. So why not build an information-age market economy around this difference? If revenue collection were based on monitoring the use of software inside a computer, vendors could dispense with copy protection altogether. They could distribute electronic objects for free in expectation of a usage-based revenue stream. (This, of course, raises the same hairy privacy issues that we trade off when we choose to use credit cards instead of cash or talk by telephone rather than face to face. The real risk to privacy here does not arise when usage information is used only for billing, but from any possibility that it might be used for other purposes.)

Treating ease-of-replication as an *asset* rather than a *liability*, superdistribution actively encourages free distribution of information-age goods via any distribution mechanism imaginable. It invites users to download superdistribution software from networks, to give it away to their friends, or to send it as junk mail to people they've never met.

Why this generosity? Because the software is actually "meterware." It has strings attached, whose effect is to decouple revenue collection from the way the software was distributed. Superdistribution software contains embedded instructions that make it useless except on machines that are equipped for this new kind of revenue collection.

Superdistribution-equipped computers are otherwise quite ordinary. They run ordinary pay-by-copy software just fine, but they have additional capabilities that only superdistribution software uses. In Mori's prototype, these extra services are provided by a silicon chip that plugs into a Macintosh coprocessor slot. The hardware is surprisingly uncomplicated (its main complexities being tamper-proofing, not base functionality), and far less complicated than hardware that the computer industry has been routinely building for decades. Electronic objects intended for superdistribution invoke this hardware, which provides instructions. These instructions check that revenue-collection hardware is present, prior usage reports have been uploaded, and prior usage fees have been paid. They also keep track of how many times they have been invoked, storing the resulting usage information temporarily in a

By Brad Cox



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Software users receive monthly bills for use of each top-level component – say, Microsoft Excel, *Myst*, or a Net-based rock video. When these bills are paid, payments are divvied up between the makers of the component and makers of subcomponents – in proportion to usage. For example, for the rock video, payment might go to MTV as well as to the artist. In other words, the end-user's payments are recursively distributed through the producer-consumer hierarchy. The distribution is governed by usage metering information collected from each end-user's machine, plus usage pricing data provided to the administrative organization by each component vendor. (The various rounds of payment resemble those made by Visa or MasterCard.)

Since communication is infrequent and involves only a small amount of metering information, the communication channel could be as simple as a modem that autodials a hardwired 800 number each month. Many other solutions are viable, such as flash cards or even floppy disks to be mailed back and forth each month.

Consider an author who wishes to distribute or sell a multimedia document that cannot be handled as a simple text file. Without superdistribution, the author's market is confined to those who have already purchased a program capable of displaying this document – a run-time version of Macromedia Director, for example. The same occurs at each lower level of the producer/consumer hierarchy. The market of a programmer who wishes to sell a reusable software component is restricted to those who have already purchased the components and tools upon which the software component relies.

With superdistribution, the market is no longer restricted to those who own Director, because it will be acquired by the customers' operating system as if it were a part of the document. The creator of the document accrues revenue from those who read it, as does the creator of Director.

The user's operating system acquires subcomponents of the document, such as Director and any subcomponents it relies on (QuickDraw, etc.), from the hard drive's cache, automatically loading it as needed from the network. The operating system can do this automatically and transparently because loading software involves no financial commitments when revenue is based on usage instead of acquisition of copies.

Superdistribution addresses the perennial, implicit questions of those who might potentially provide the smaller-granularity reusable software components upon which an advanced software engineering culture could be founded: Where do software components come from? Why should I bother to provide them? Why should I engage in such gritty activities as testing and documenting reusable software components sufficiently so that others might use them? What is in it for me?

Where software's ease-of-replication is a liability today (by disincentivizing those who would provide it), superdistribution turns this liability into an asset by allowing goods to be distributed for free. Where software vendors must now spend heavily to overcome software's invisibility, superdistribution would thrust software out into the world to serve as its own advertisement. Where the personal computer revolution isolates individuals inside a stand-alone personal computer, superdistribution establishes a cooperative/competitive community around an information-age market economy.

By separating revenue collection from acquisition of copies, hard drives and computers can disappear and become just part of the plumbing that conveys information-age goods between producers and consumers. Computers and telecommunications links become invisible, a transparent window through which individuals can communicate, cooperate, coordinate, and compete as members of an advanced socioeconomic community.

Brad Cox (bcox@gmu.edu) is founder of the Coalition for Electronic Markets and a faculty member in George Mason University's Program on Social and Organizational Learning.

Access to Education

Connecting every public school classroom and library to the infobahn is a legitimate goal of public policy.

local communities and school systems to choose whether or not to pay the tolls for education on the information

How to engineer the information superhighway so it benefits all in our society has become a burning issue.

Critics would leave it to cash-starved

By George Lucas and Sen. Bob Kerrey

superhighway. In their model, communities can decide either to increase teachers' salaries, buy new textbooks, or cruise the infobahn. This country should not accept such an either/or proposition.

Such a course would hobble American education, especially in rural communities and inner cities.

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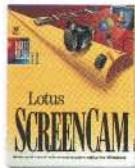


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regulation and toward a competitive market where customer choice drives the system. However, we also strongly believe that schools, teachers, and students will be left in the competitive dust unless we explicitly define and declare their needs.

Traditionally, subsidies have helped to extend basic phone service to include rural and low-income customers. Everyone benefited by having more users on the public switched telephone network. However, in the dawning of the information age – where access to information will be the currency of power and knowledge – the definition of access for educational institutions should be expanded to include multimedia technologies and services.

We support introducing competition into the local exchange market and using market-based theories and pricing. However, this doesn't mean that subsidies and public mandates should be abandoned entirely; some of them are justified. If we leave the market alone, we will not achieve universal access, the only way to attain equity of opportunity for teachers and students. Connecting every public school classroom and library to the developing superhighway is a legitimate goal of public policy. Adopting regulatory policies that will advance this cause is crucial.

Telephone lines should connect every classroom to the Internet and other electronic services. Students would then gain access to resources few schools can afford; they could then communicate with students and experts around the world. It also will support the teachers – perhaps the only group of professionals in our society expected to do their jobs with no office, no telephone, no privacy. Telephone lines in the classrooms would enable teachers to use the telephone and electronic services like other professionals do: to access information and communicate with community members, peers, parents, students, and experts.

This is only the first step, however. We have talked with students, parents, educators, and business, community, and political leaders to formulate a vision for education in the 21st century. This vision stresses lifelong learning and is student-centered, making teachers, families, and communities co-facilitators of learning. This vision takes advantage of new technologies to support the educational process.

Nationwide, momentum is building to transform our educational system, and the proper use of technologies can reinforce these efforts. But the benefits from educational technology ought to be part of the government calculus in determining overall telecommunications policy, not just part of our policy for improving the quality of education. Another benefit – which the private sector should appreciate – is that market demand for advanced telecommunications services will increase as more people have the capacity to communicate with these new media. As we increase the demand for advanced telecommunications services, the average costs of these services will go down, making them more affordable for everyone. All of these factors must be an integral part of any cost-benefit

analysis in determining public policy.

Congress today is considering these interrelated issues. One of its major challenges is to figure out how to integrate the benefits of universal service policies based on service mandates while at the same time fashioning policies based on economic requirements and competition.

The communications paradigm used in this country for the past 60 years needs to be overhauled. Congress needs to break out of the traditional boxes lawyers and regulators have built over the years – policies that separate "voice-phone" service as basic and essential, but lists everything "new" (such as touch-tone service) as advanced and competitive and, therefore, a luxury and optional.

Yes, we do need a more competitive telecommunications industry. This can happen if Congress (1) creates incentives for all competitors to wire and connect schools, homes, and libraries with educational technology and products; and (2) encourages and permits all providers of telecommunications services to freely provide them. Of course, we need to monitor the process to see that our national objectives are being met by this market incentive approach.

Congress is currently considering legislation addressing these goals. In June, the US House of Representatives approved the National Communications Competition and Information Infrastructure Act of 1994, which calls for the FCC to promote the provision of advanced telecommunications services to schools, hospitals, and public libraries. (The House also approved another bill affecting telecommunications, the Antitrust Reform Act of 1993. For another perspective on Congressional legislation pending at *WIRED*'s presstime, see "Universal Service," page 102).

The US Senate will soon take up the Communications Act of 1994, which seeks to achieve many of these universal-service protection objectives. In particular, the bill would require all telecommunications carriers to contribute to preserving universal service. Importantly, the bill would require all telecommunications carriers to provide educational institutions – among other entities – interstate and intrastate access services at preferential rates. The FCC would establish rules to enforce this requirement. The bill also would require the FCC to ensure that all public elementary and secondary school classrooms and libraries have access to advanced telecommunications services.

We fully support these efforts, and call upon all educators and parents to speak up for policies that will support universal access to today's telecommunications services as well as to the interactive, broadband technologies of tomorrow. We must all work together to ensure that the information superhighway is the road to educational excellence in America.

George Lucas is a filmmaker and chair of the George Lucas Educational Foundation. Sen. Bob Kerrey, D-Neb., is an original co-sponsor of the Communications Act of 1994.

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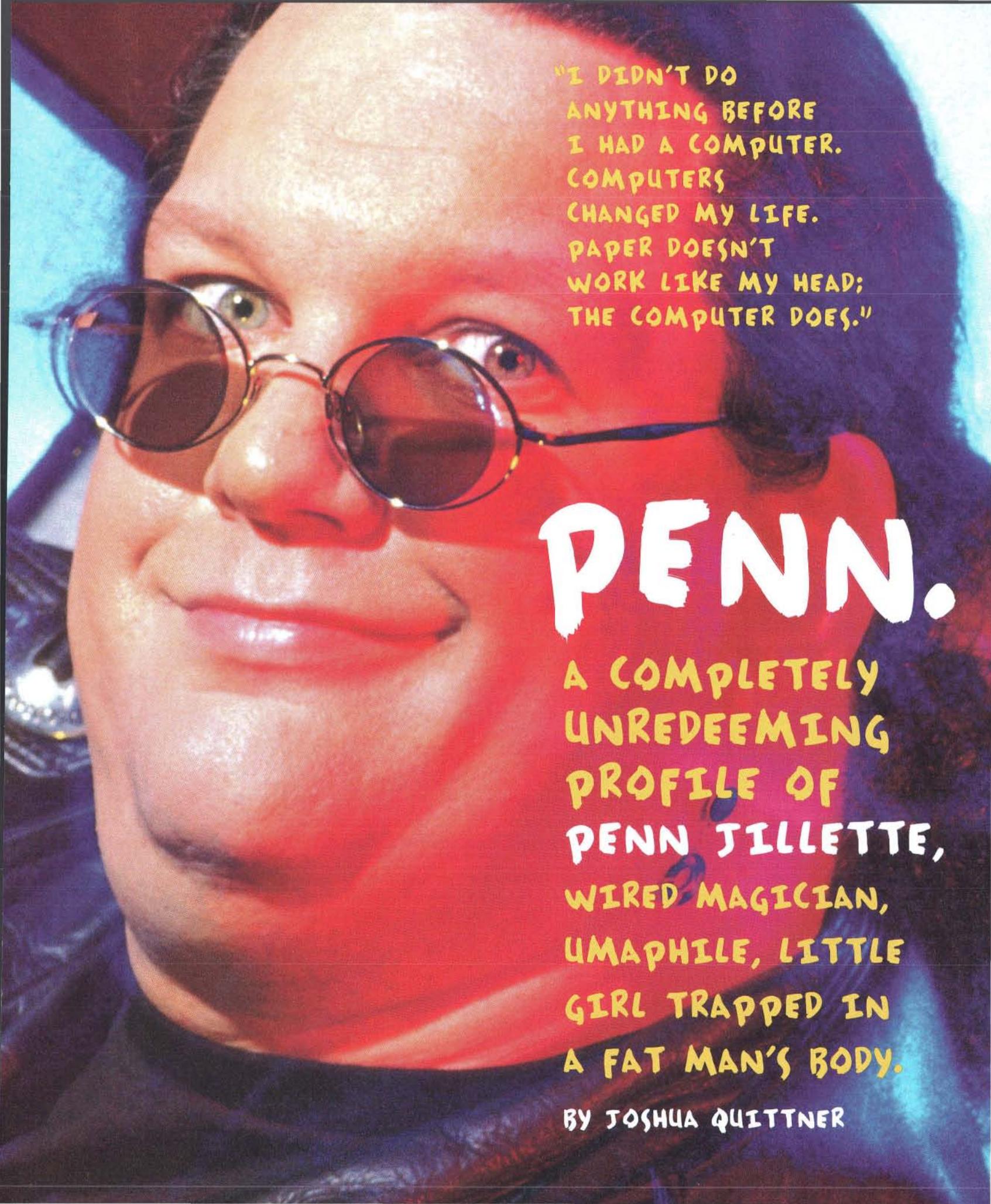
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ANYTHING BEFORE
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CHANGED MY LIFE.
PAPER DOESN'T
WORK LIKE MY HEAD;
THE COMPUTER DOES."

PENN.

A COMPLETELY
UNREDEEMING
PROFILE OF
PENN JILLETTE,
WIRED MAGICIAN,
UMAPHILE, LITTLE
GIRL TRAPPED IN
A FAT MAN'S BODY.

BY JOSHUA QUITTNER

"TAXI!"

bellows Penn Jillette, throwing open the double doors of his apartment building and hurtling out into the midtown Manhattan street.

This is a terrifically corny thing to say, as Penn isn't even looking for a taxi. He's just saying it for effect.

His buddy, The Public Servant, has just arrived and smiles darkly in Penn's wake. The Public Servant (not his real name) is a powerful politician, a top aide to a senator whose name you'd recognize in a Times Square minute. The Public Servant takes daily briefings at the White House and virtually controls one of the Senate's most powerful committees. All that stroke and The Public Servant wants nothing more than to be in Show Biz. He wants it so much he's glommed onto Penn, just for the contact high.

It's an odd-couple scene: The Public Servant wears a conservative trench coat and suit, and big-haired Penn wears a black leather Harley Davidson motorcycle jacket, an earring shaped like an elephant tusk, a pound of silver bracelets, red nail polish on his ring finger, and a white T-shirt emblazoned with the logo of his favorite band, Half Japanese.

Even in Manhattan, where, by God, you see it all, people are practically diving for cover as Penn, 6 feet 6 inches and 275 pounds, lumber-thrusts up Seventh Avenue, big voice blaring, slapping his pal, The Public Servant, on the back, shouting, "Man, it is fucking GREAT to SEE you! You FUCK!"

I have to say right here, right now, I am a little uncomfortable being part of Penn's entourage. I am not The Public Servant, and celebrity profiles are not my event. I don't read them; I don't write them — not that Penn Jillette is Jack Nicholson or anything. I mean, I'm assuming you know who he is: the talking half of the stillhip Penn & Teller magic act; the sometime guest on, say, the David Letterman show; the voice of Comedy Central. Or maybe you already caught Penn & Teller's act in person; it ran on and off Broadway for so many years that they're moving to Las Vegas, partly on the premise that New York is played out.

Now, I can understand if you're thinking, Big deal, why is *Wired* so hot for Penn Jillette? What has he got to do with digital culture? This is not *People* magazine. You want lifestyles of the rich and famous, watch *Entertainment Tonight*.

Here's why I am following Penn around for the next 40 hours: Penn Jillette might be the most wired person in America.

I know you're saying to yourself, Hype, hype, hype. And frankly, I didn't believe it myself, until I ran Penn on the *Wired* Universal Nerd Index. His rating is way over the top:

- Would rather hang out with scientists than rock stars. (earns him 25 points)
- Has a stopwatch-sized gadget with a voice-recognition chip that understands phone numbers, and a buffer into which he can dictate four minutes worth of recording. There is no known use for this object. (15 points)
- Has a Japanese-made television in his office that is always on CNN — muted, with that way-cool, closed-caption chip spewing out subtitles. (8 points)
- Runs invitation-only computer bulletin board. (50 points)
- Doesn't do drugs. Not even coffee, tea, or cola. (2 points)
- Uses a PC laptop instead of a PowerBook because "I like a command-line interface." (12 points)

- Carries money in a "carny roll" (big bills on the outside with progressively smaller denominations nested inside) and points this out to strangers. (4 points)
- Does card tricks. (6 points)

That's 102 points. Stephen Hawking himself scored only 94. And Hawking doesn't do Movie Night. Movie Night is a Friday-night ritual that begins at the Howard Johnson in Times Square, where more than a dozen people, mostly guys — not beer-guzzling, sports-loving guys either, but *computer scientists and statisticians and molecular biologists* — convene for a healthy HoJo repast. Then, like the high-school Audio Visual Squad out on a toot, they march off to see a midnight movie at one of the area's finer cinemas.

You could say that Penn Jillette is the captain of that squad, the dude with the keys to all the rooms.

Only now, he's a grownup and can get girls.

But such standardized tests can tell you only so much about a person, of course, and when that person happens to be a world-class magician — someone used to tampering with reality — it's prudent to double-check your results with some field work. A long weekend with Mr. Jillette, 39, will be the wired acid test, which explains why, about two hours after hooking up with him, I find myself having dessert with him and The Public Servant at Café Un Deux Trois in the theater district. (Not lunch, which we ate at a Chinese restaurant earlier; just dessert. The men like the dessert here and like sitting in a window seat that they refer to as "The Sinatra Table.") Actually, Penn and I are each eating a dessert; The Public Servant, smelling *Wired* expense account, has ordered *two* desserts, and is forking creamy spoonfuls of profiterole into his mouth, pretending to be interested while Penn explains to him why it is his duty, as one of the most powerful humans in Washington, to sink the Clipper Chip.

Penn not only understands the Clipper debate but he explains, quite eloquently, how key escrow encryption works. He draws diagrams. On the place mat. He's good.

"I am familiar with what you're talking about," says The Public Servant, who points out that he recently saw something on TV that explained the issues. "It's definitely a problem that the government, through a technological fluke that allowed it to do wiretaps on telephones, now believes it has a constitutional right to eavesdrop on all conversations."

Penn beams and nods his head vigorously. The Public Servant is getting the message, he's on board. Penn loves this guy, the quickness of his mind. They've been friends since working on a late-night talk-show pilot a few years ago. "Exactly. Now, what the fuck can we do about it? What should we do?" Penn asks.

"My advice to you is surrender," says The Public Servant. "It's your only option."

An hour later and Penn and I are in a taxi, stuck in traffic, and Penn's got the stopwatch-sized Voice Organizer up to his ear, trying to hear the address of a photographer's studio where he is supposed to be at this minute. The Public Servant has split, mumbling something about "making Fat Boy's day," and Penn is scheduled to have a new head shot taken for his monthly column in *PC/Computing* magazine.

A magician who writes a column for the third-largest PC magazine in the country? Yes, it's wired. Penn writes 600 words for the column, which has the coveted, well-read back page position. The column follows two rules: it is never about computing, and it always mentions Uma Thurman. Thurman was June in Philip Kaufman's *Henry and June*. Penn has never met her but thinks "her name sounds like a sex

PENN WORKS THE TOSHIBA LAPTOP IN THE OFFICE OF HIS NEW YORK APARTMENT.

THE MONTHLY COLUMN HE WRITES FOR PC/COMPUTING HAS TWO RULES: IT IS NEVER

ABOUT COMPUTING, AND IT ALWAYS MENTIONS

UMA THURMAN.



INTERACTIVE ENTERTAINMENT WILL NEVER WORK,

BECAUSE ENTERTAINMENT BOILS DOWN TO THE PERFORMER, NOT THE AUDIENCE, BEING IN CONTROL, SAYS PENN.

"THE WHOLE FUCKING WORLD IS PRETENDING THE BREAKTHROUGH IS IN TECHNOLOGY.

THE BOTTLENECK IS REALLY IN ART."

goddess." He said he was first attracted to her after seeing her near-naked body in some film. He dropped her name in one of his first columns when he needed an example of a file name.

Penn used *thurman.uma*.

"I have mentioned her – and will continue to mention her – more than any other writer in the world," he vowed in another column.

Penn's columns tend to be unlike any others you'll see in PC mags. He doesn't shrink from the confessional, nor does he shrink from making fun of his own iconoclastic quirks. "Among my many stereotypical high-school girl attributes is keeping a journal," he writes. "Bubble baths, manicures, big hair, malls, giggling, sports ignorance, and Madonna identification are also on that list, and you can bet a few meg that I'll get to those subjects in future columns."

We finally ditch the cab and run the half mile or so to the studio, which doubles as the photographer's apartment. It is flawlessly sparse, lofty, and bright. Fresh-brewed coffee, cakes, and juices, including watermelon juice, are in the kitchen for the clients. But Penn immediately decides that something is awry.

"You seem to have fewer pictures of naked women than most photographers," Penn says. He is crushed.

Then he poses for a variety of stills. Sunglasses on, sunglasses off and blue eyes blaring. Head



cocked. Ponytail cinched in a barrette. Ponytail undone. ("Do you think the hair looks a little... too... Howard Stern?") Then he asks the photographer if the camera would be able to capture something he writes on his wristwatch calculator. The photographer says maybe. Penn types out:

"PC/C 666."

"Most of my hate mail comes from Christians," he explains. "This'll give them something to work with." Penn is such an ardent atheist he refuses to go to weddings.

The assistant asks Penn about the unusual double-ax pendant around his neck.

"It's a lesbian symbol which means I'm a slave to an Amazon. Which I think is funny on a large guy like myself," Penn explains. The assistant stares at him. "I'm a little girl trapped in a man's body," Penn adds. The assistant backs away uncertainly.

We decide to walk the 10 blocks back to his apartment. Testing the Most Wired Guy in America thesis, I ask him if he'd rather be a scientist than a magician.

Joshua Quittner covers cyberspace for Newsday. He's the co-author of Masters of Deception: The Gang that Ruled Cyberspace, which will be published by HarperCollins in January.

"Give me 50 or 40 more IQ points and I'd be right there alongside Rob," he says, referring to Rob Pike, one of his best friends. ("Rob and I are stupidly close.") Pike also happens to be a "scary-smart" computer scientist at Bell Laboratories, AT&T's research lab and patent mill, across the Hudson River in New Jersey.

Penn always loved science and would have liked to be a scientist, just like Pike. But he felt he didn't have the aptitude, not to mention that he never went to college. "I would never want to do something unless I could become a player," Penn says.

Say he *could* become a player today: would he rather be a scientist than a magician? "No. I live a perfect life."

Besides, he says, he uses his fame to meet scientists. Around 1987, when he and Teller were doing a show in the Boston area, Penn went over to the Media Lab at MIT and put up a sign on a (physical) bulletin board inviting Media Lab types to his show: "I really dig you guys, I'm a big fan of the Media Lab, and anybody who wants to come, come." For free. A number of them came, and Penn later got a tour of the lab. He made some friends there, one of whom introduced him, via e-mail, to Pike.

"Rob Pike wanted to pull a scam on his boss, Arno Penzias," Penn recalls. Penzias, a Nobel laureate, was vice president of research at Bell Labs. Penn & Teller helped him concoct what has come to be known as Labscam, a practical joke that cemented their friendship.

Here's how Labscam worked: Pike invited Penzias to participate in a demonstration of a voice-recognition project that he and Unix co-creator Dennis Ritchie were supposedly working on. He

sat in front of a computer terminal while a camera with a bright light shined in his eyes. ("The bright light was my idea: a practical joke can't be all sweet and pleasant," Penn says in a home video of the event.) Penzias was told to speak to the computer. The computer, using sophisticated software, would quickly learn Penzias's voice, as he repeated such words as "Ho-ho-kus," and phrases such as "Kenneth, what is the frequency?"

Then, for the *pièce de résistance*, Pike told Penzias that the computer now understood him and was ready to demonstrate its prowess. Penzias was given what Penn calls "the Magician's Choice": he was asked if he wanted to interview the unknown star of a soap opera he didn't watch, the author of a book about modern-dance empress Martha Graham, or Penn & Teller.

"Call us cocky, but we felt he'd make the right choice," says Penn.

He did. Penzias was told that he could "interview" Penn & Teller, whose images were on the computer screen, by asking questions from a topic list he was given. The computer would not only understand Penzias's questions but would compile answers by splicing together video footage. Of course, what Penzias didn't know was that the real Penn & Teller were sitting in an adjacent room and the images of the pair on his computer screen were nothing more than The Boys on a closed-circuit link.

After a few foul-ups and incorrect responses, Penzias got around to asking the main question on his list: "Will you do a trick for us?"

Well sure, said Penn, and the two got up from their seats. The computer image-Penn said that he and Teller had always wanted to go from TV to reality and, as Penzias looked at what he thought was a



recording, the real Penn & Teller ambled through the door to Penzias's office. In the video, Penzias looks ashen, shaken — like he's about to faint. In other words, it was a successful practical joke.

"I like to think that when you team up Dennis Ritchie, Rob Pike and Penn & Teller, some people will be terrified," says Penn.

The first thing you see when you enter Penn's loft-like apartment is a pair of large, carved, wooden tikis. The title of the work is "Mama Tiki Cries While Daddy Tiki Eats Their Young." It's quite good. If you like tikis.

The apartment is filled with art, as well as kitsch: dice clocks and skulls and chili-pepper Christmas lights. Also, lots of pictures of naked women. At one end of the loft is a room furnished with Mission-style chairs and a settle. When Penn flips a switch, the draperies shut automatically and a movie screen slinks down from the ceiling so you can watch movies from his laserdisc and video collection. Very wired.

All the movies are archived on Penn's computer; after one is viewed, Penn notes the time and date, and prints it out on a list. That way, when he gives you the list, you can see if he saw something recently and you'll know not to request it.

The back wall is filled, floor to ceiling, with his video and CD collection, including a CD of Richard Feynman playing the drums (called *Safecracker Suite* and featuring "Interaction by the Three Quarks"). The top few shelves contain Penn's porn collection. My favorite title:

REALLY HARD KINK,

Vol. II. I can't stop thinking. What did volume one leave out?

At the other end of the apartment is Penn's office. A massive, dirty pink, corrugated metal desk dominates. A stenciled border rims the room. The stencil alternates between three things: an alligator, a microchip, and the silhouette of a naked woman. Along the windowsill are some photos. There's one of his parents, holding a cactus. Next to that is a photograph, circa 1910, of a young man flanked by young women. "That's my Uncle Johnny, who died swimming the Charles River when he was 25," Penn says. Uncle Johnny was trying to win a bet. "My aunts say I remind them of him."

Penn sits down at the pink desk and fires up his Toshiba laptop, the only computer he owns. It has a color screen. All of Penn's databases are stored on the Toshiba, including an inventory of the laserdiscs and CDs he owns, as well as a daily log of each CD he listens to. That's so Penn can say he was listening to a particular thing at a particular time on a particular day, if he wants to. He also takes notes on every conversation he has. And, since 1985, he has written two pages in his journal each morning.

As I listen to this, I am beginning to think I am the subject of Nerd-scam — you know, convince *Wired* what a PowerNerd you are to impress the readers.

But Penn insists this is all real, all part of his daily routine: "I'm very organized. I didn't do anything before I had a computer. Computers changed my life. Paper doesn't work like my head; the computer does."

You might wonder what Penn does with all his databases.

Much of the information finds its way onto the Jungle.

The Jungle was named after a Bally pinball machine, Jungle Lord, which was a popular feature of Penn & Teller's office for many years. The name lives on as the moniker of Penn & Teller's private electronic bulletin board, which went up in March 1987. The Jungle's primary role is to keep Penn and Teller wired with each other and their office while they're on the road. The board, which

resides on a computer in their office, has been useful as a way to exchange script ideas and conduct other business.

Beyond that, though, it provides a place where Penn and Teller can always find their friends. About 20 people have accounts on The Jungle. It is harder to get an account there than it is to get a MacArthur grant. Even *The Public Servant* isn't on it, though Pike, of course, is.

"What I usually do, when I have an adventure in the world, I write up a rough draft, which I send to my buddies on The Jungle," Penn says. One posted adventure details Penn's exploits shooting a pilot in Hollywood for a TV show with a heavy virtual reality hook. Penn got to do his own stunts. Penn got to light himself on fire. He wore a Nomex suit. "Just saying the word *Nomex* makes me hard," he says.

The door to Penn's apartment flies open and an angel-faced speedster rollerblades in and plops down onto the sofa.

"He's my geek," Penn says of the young man. "He does my computer stuff."

His name is Colin Summers and he's worn either rollerskates or rollerblades every day — all day — for the past 20 years. Penn found him rolling around a computer store where he was a salesman in 1985. Penn had become entranced with computers and wanted to ramp up as quickly as possible. So he went out in search of a tutor and randomly picked Colin. "I said, 'You — I want to know how to do cool things with a computer,'" Penn recalls. "The chances of being ripped off by someone you pick at random are very low; the chances of being ripped off by someone who picks you are very high."

Penn and Teller were writing scripts on PCs at that time and they wanted a central place to drop them off, at any time of day. So they hired Colin on as the computer guy.

Colin is also trained as an architect and is helping Penn design a ranch in Nevada, "an A-frame on over five acres of pure desert," called

THE FUCKIN' A.

Penn has been profiled in lots of magazines, including *The New Yorker* and *GQ*. He claims he has never read one profile, though his friends do and tell him what they read. "If you write anything about me that I don't like, I'll quit my job," he cautions me now. "And my new job will be hunting you." Is this wired? Or psychotic? You be the judge. Colin skates out of the room.

Iwonder what we're going to see for Movie Night," Penn muses. It's been about nine hours since Day One began, and we are heading uptown, after seeing a play called *Blood Orgy of the Carnival Queens*.

As the leader of Movie Night, Marc Garland will decide what tonight's movie will be, Penn explains. The friendship of Garland and Penn dates to Greenfield High School, in Massachusetts, where Garland was the math-and-science wizard and the only guy with longer hair than Penn.

You can whine and wheedle about wanting to see this movie for Movie Night, or that one, but it makes no difference. Garland decides.

"There has been a lot of speculation about how Marc selects a movie," says Penn. "But no one really knows for sure."

Rob Pike is already waiting at HoJo's with Xerox handouts of a recent *Nature* article when we sit down. The article is about how lawyers don't understand the statistical underpinnings of DNA "fingerprinting."

"The question they ask of the guy in the dock is, what is the

Politicians love to give it lip service, but universal service is a 1930s solution to a 21st century problem.

The problem is an excess (not shortage) of bandwidth, and the solution is called **Open Access.**

By John Browning

Universal Service (An Idea Whose Time Is Past).....

This is the story of the noblest idea in the history of technology: universal telecommunications service. Universal service brought America into the information age. It put telephones into every American home (well, about 94 percent of them) and wove telephone lines through the fabric of American life. It set the Andrews Sisters to singing "Pennsylvania 6-5000," provided a generation of teenagers with their own private space to create their own private culture, and set Prince Albert free from the can. Today, when telephone, television, and printing press are poised to merge into something new, digital, and as-yet-undreamt-of, it is tempting to hark back to the original ideas of universal service. The hope is that these ideas will help to weave new networking technology into American life as seamlessly as the telephone.

Sadly, they won't.

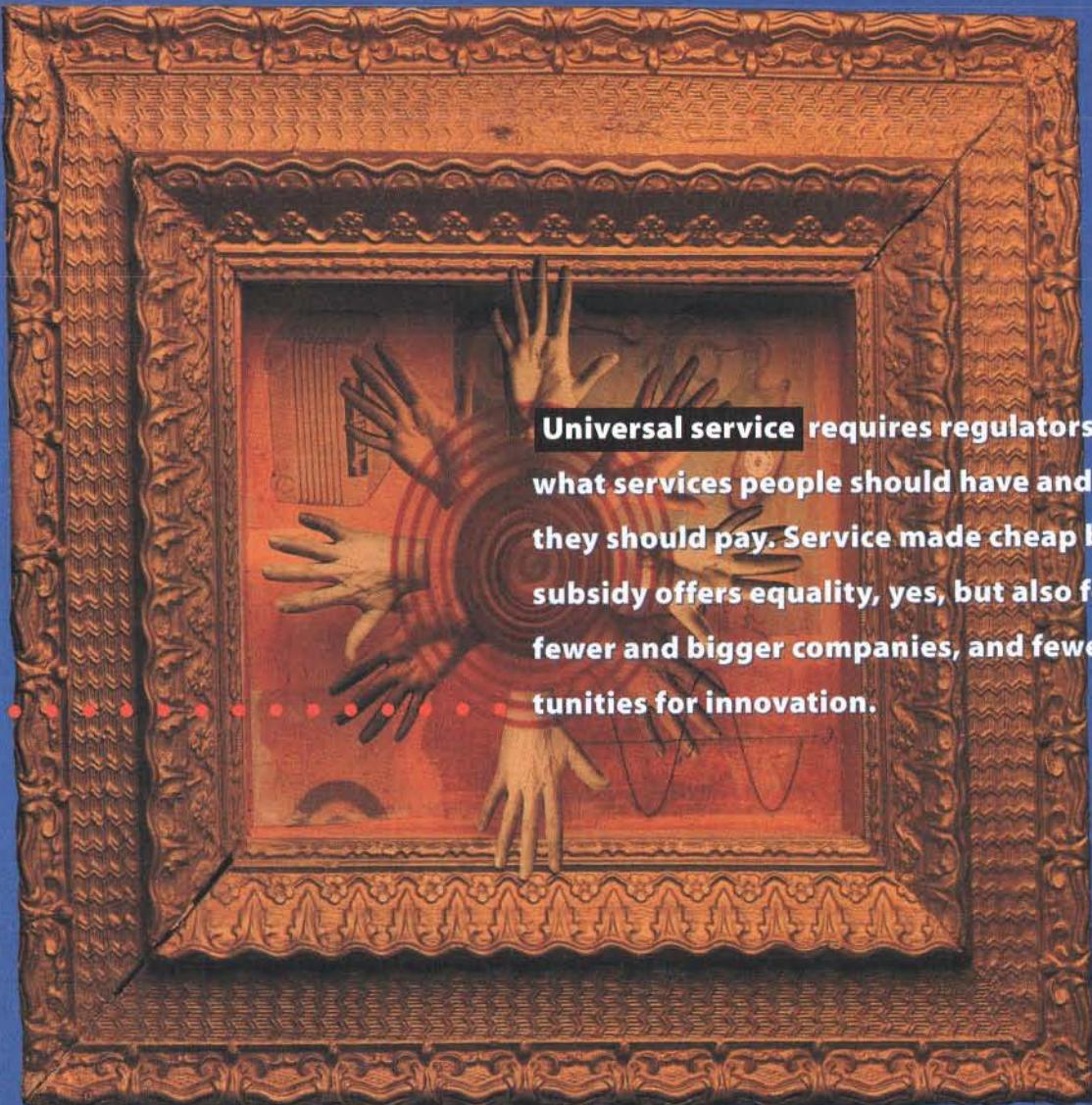
Universal service turns on its head the usual way of setting prices. Instead of starting from costs, universal service starts from a calculation of how much a customer should ideally have to pay — "affordability," in the legislative jargon. The goal is to maximize social benefit — rather than profit. If the cost of a service is higher than its "affordable" price, then the deficit is made up by charging higher prices on some other, less worthy service. So when the US Congress recently decided to provide a service for deaf telephone users that would translate speech into type on a terminal, and vice versa, it opted neither to

charge the deaf for the service nor to raise taxes to pay for it. Instead lawmakers tacked the cost of the service onto the price of long-distance telephone service. When AT&T was a monopoly, such accounting jiggery-pokery was relatively easy to administer. So long as the network as a whole made a profit, the prices of individual services could be set wherever AT&T and its regulators thought best. But today things are different.

Universal service was made a guiding principle of American telecom regulation in 1934. While the spirit of universal service — the idea that everybody should be able to speak as freely in the ether as they do in the air — is noble, its substance has grown woefully dated. In 1934, legislators assumed that telecommunications was a monopoly; today it is (or rather, should be) a competitive business. In 1934, only one kind of service was delivered, through one kind of telephone (the plain, black kind); today voice, video, and data are carried over wires, fiber optics, and airwaves. And in 1934, technology required that all of the intelligence needed to run the network was held in the switches at the network's core; today that intelligence is fast migrating to computers on the network's periphery — and many of those computers are owned by customers rather than service providers.

For these reasons and more, a return to the traditions of universal service — to services defined by government mandate, often made cheap by cross-subsidy — may bring back more of the past than even its staunchest supporters would like: equality, yes, but also fewer choices, fewer and bigger companies, and fewer opportunities for innovation. It could, in fact, derail the entire information economy.

John Browning is a writer and consultant living in London. He is a contributor to The Economist, and wrote "Power PC: Reengineering Regulation" for Wired 2.07.



Universal service requires regulators to decide what services people should have and what prices they should pay. Service made cheap by cross-subsidy offers equality, yes, but also fewer choices, fewer and bigger companies, and fewer opportunities for innovation.



• • • **Open Access** will protect people's abilities to decide for themselves, largely by ensuring that no big company can put its own interests ahead of consumers'.

This leaves politicians in a bind. The fact is, legislators have included universal-service regulation in every bill promoting the information superhighway. (See box, page 153.) Unfortunately, universal service is profoundly incompatible with another major item on politicians' reform agenda: the introduction of competition into telecom markets. In trying to mix the two there is a risk that reformers will inadvertently capture the worst of both worlds: anemic markets regulated more for the benefit of entrenched business interests than that of the general public.

Even as they promote universal service, politicians are hedging their bets – saying that they must redefine universal service as well as reemphasize it. The hard truth, however, is that it is time to bury universal service – to bury it slowly, gently, and with great care to preserve both its spirit and its many achievements.

But to bury it nonetheless.

New technologies and new networks require a shift toward regulation based not on universal service but on open access. The distinction is subtle, but crucial. Mandating universal service requires regulators to decide what services people should have and what prices they should pay. Regulation focused on open access, on the other hand, protects people's abilities to decide for themselves.

Open access regulation is not deregulation. On the contrary, it requires the government to intervene vigorously – particularly to ensure that small, new competitors get to use the existing telecom infrastructure on the same terms as the entrenched (soon-to-be former) monopolies that built it. This is both more difficult and more politically thankless than throwing subsidies at popular services. To see why it is necessary, start by looking at the regulatory options for networks from a politician's point of view. Then examine today's regulatory machinery to see why universal service and competition don't mix.

Making the world safe for technology

Led by Vice President Al "Information Highway" Gore, politicians have spent much of 1994 painting a rosy picture for the American public of how new networks would transform education, health, democracy, and life as we know it. The public is enthralled. Although only about 15 percent have even the minimum requirement for network participation – a computer with a modem – everybody seems to want to get wired.

Politicians now have three options to satisfy the expectations they have created:

Expand network subsidies As much as politicians would like to claim credit for building the Internet, today's networks receive relatively little federal money. The Internet gets about US\$11 million a year to subsidize long-distance data-transmission capacity run by the National Science Foundation (the NSFNet). The Commerce Department is offering \$26 million this fiscal year for experiments in community-oriented networking. The High Performance Computing Act provides subsidies for the development of new network technologies. But all are peanuts compared to the federal billions spent on the object of Gore's favorite metaphor: highways.

Mandate service With a bit of tweaking, the regulatory machinery created to require universal service for basic

telephone service could be used to require cable and telephone companies to offer advanced services – digital lines, Internet connections, videophones, and the like – at rates regulated to guarantee their affordability for both rich and poor (at subsidized rates, of course). Various groups, notably the Electronic Frontier Foundation in its Open Platform initiative, propose in one way or another to use the government's regulatory power to push the pace of network change.

Promote competition In long-distance telephone services, competition managed to boost the quality and variety of services even as it reduced prices. Most politicians and regulators are now convinced that it can do the same in local telephone service, cable television, and emerging new network services. So reformers are trying to set the stage to enable it to do so, by removing restrictions that prevent regulated local-telephone and cable-television companies from competing with firms in unregulated markets, and vice versa.

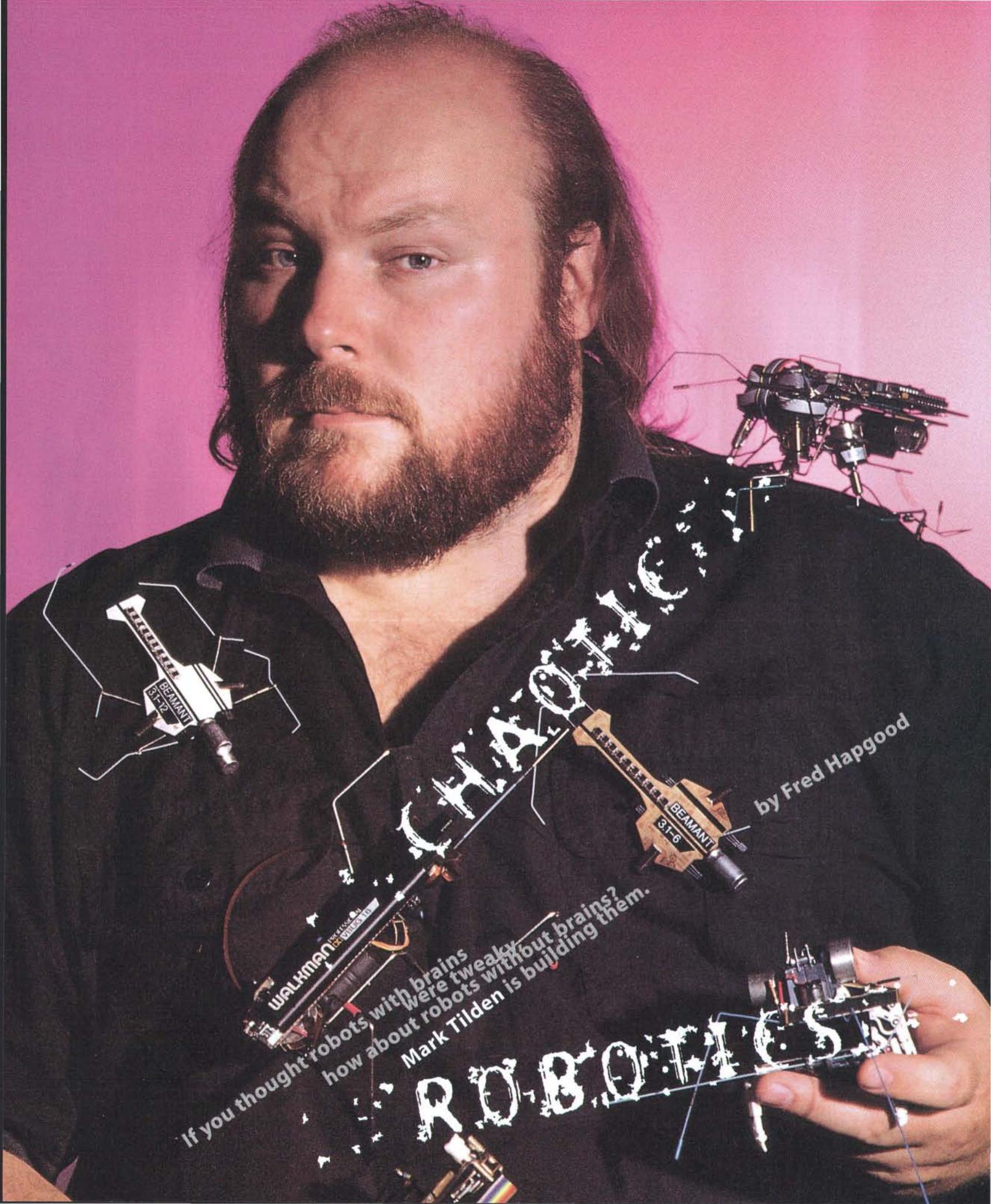
Congress prefers to fudge the choice. All of the telecom-reform legislation surfacing in 1994 contains a mixture of subsidies, service regulation, and competition. The same combination will probably recur in any future legislation, because each satisfies different and opposing interest groups. Subsidies and service regulations satisfy public-interest groups who believe big companies are too self-interested and ignorant to fulfill the promise of networks without strong leadership from a visionary government. Competition satisfies big companies who, on the contrary, argue that they will satisfy everybody's greatest networking fantasy as soon as they are released from meddlesome, restrictive government regulation.

Unfortunately, competition and subsidized, regulated network services are profoundly incompatible, and universal service stands at the heart of the contradictions. To introduce competition without a complete overhaul of the universal-service funding mechanism would simply bankrupt those providing it. By trying not to disappoint anybody, politicians may yet disappoint everybody.

Give me TCP/IP or give me death

Today it is local telephone monopolies that provide the services mandated under the name of universal service – a party line in 1934, touch-tone phone service today. Prices for universal services are set at or below the cost of the service, and thus the services are cross-subsidized from inflated rates charged to some of the local-telephone monopoly's other customers, typically business.

Universal-service obligations are a burden for the local telephone companies who now bear them, but they are also the bedrock of their monopolies. The introduction of competition blows apart this system of cross-subsidies. Competitors nab the overcharged customers, leaving the ex-monopoly with those customers on whom it cannot make a profit. Kaboom: the network collapses onto the heads of those who have no other service or provider to turn to. Since the break-up of AT&T in 1984, and the beginnings of competition in long-distance markets, the threat of just such a service meltdown has been local-telephone monopolists' most effective lobbying weapon against competition. **152 ▶**



by Fred Hapgood

If you thought robots with brains
were tweaky,
how about robots without brains?
Mark Tilden is building them.

ROBOTICS

Wired: Have you been involved with robots for long?

Mark Tilden: Since always. I built my first robot doll out of wood scraps at the age of 5 and progressed from there to a Meccano suit of armor for the family cat at the age of 6. I've been building devices ever since.

In the '50s and '60s there was much expectation about robots.

The real history of robotics started in 1959 when a 19-year-old Isaac Asimov invented the idea of the positronic brain. When the computer came along, people assumed robotics was a self-fulfilling prophecy. This made the domestic robot seem just a breath away. After all, it was what everybody understood and wanted from technology: something that they could kick to make life easier.

But that didn't happen.

People thought, and for the most part still think, that robots can't exist unless a brain exists first. But artificial intelligence was not yielding the promised results, so people gave up.

So where were you in all of this?

Like everyone else, I just assumed that making a robot involved creating a mind. In 1982 I tried to build myself a robot butler with a built-in vacuum cleaner. I used a 68000, 4 megs of memory. Completely conventional techniques. Spent months on the damn thing. I just got more and more frustrated. I used the Asimovian Robotic Rules (protect humans, obey humans, then look after yourself), but this made the robot so incredibly paranoid about anything in its environment that the most it could do was move away from you when you got close to it. It was pathetic. I'd come home in the middle of the day and the damn thing would be going clunk-clunk-clunk in the corner, hiding from my cat. Similar stories have occurred in pretty much every college and university around the world, from Japan to Moscow. No matter how big the computer, simple general problems made them fall on their mechanical butts.

Things changed for me in October of 1989, when I saw a talk by Rod Brooks of MIT. He basically told me everything I needed to know: Forget the brain, let's just build something with a simple stimulus-response ability. I went home that night thinking about how minimalist you could actually make this technology. Brooks suggested making a creature without any memory for its brain. But could you make a creature without a brain at all? That's what happened.

So you don't use any computers in your robots?

That's right.

No processing whatsoever?

Not even simulations. A lot of people have trouble with this. Computers have made such an impact that it's hard to think of any technology – let alone robotics – without them. The trouble with processors is that you're never finished. There's always something you can do to improve the software, there's always something you want to add on. One thing about not using computers is that you can *finish* a robot and move on to the next generation without getting hung up on the limitations of an old design.

Fred Hapgood (fhapgood@world.std.com) most recently authored Up the Infinite Corridor, MIT and the Technical Imagination (1994, Addison Wesley).

So where does the intelligence come from?

From the world. From the machines themselves. Simple machines have three advantages: accessibility, confidence growth, and emergent properties – “accessibility,” as the parts and tools are ubiquitous and cheap; “confidence growth,” as the builders find that the devices can be built in a very short period of time, sometimes hours; “emergent properties,” as these things often exhibit behavior that was not designed or predicted even though the mechanism *seems* simple. That's one source of intelligence.

Most of your robots seem to use solar power. Where did that idea come from?

From my convictions on robotic eugenics. Robots cannot reproduce themselves easily, nor would we want them to. So if you want a colony of robots to do an acceptable job, you must extend their lifetime to many years. That means solar power. Solar power also implies micro-power analog control systems, which implies slow movement, which extends the mechanical operating lifetime by exponents, etc., etc.

What do your robots do?

First of all they survive. They're survivor automata. I have three guiding principles:

- 1) A robot must protect its existence at all costs;
- 2) A robot must obtain and maintain access to a power source;
- 3) A robot must continually search for better power sources.

Otherwise known as:

- 1) Protect thine ass;
- 2) Feed thine ass;
- 3) Look for better real estate.

This makes a wild robot, a feral machine that is already useful for some purposes. Other functions require domesticated robots – wild robots that have been bribed, tricked, or evolved into household roles. But the wild robot has to come first.

What sort of practical consequences do you see for these machines?

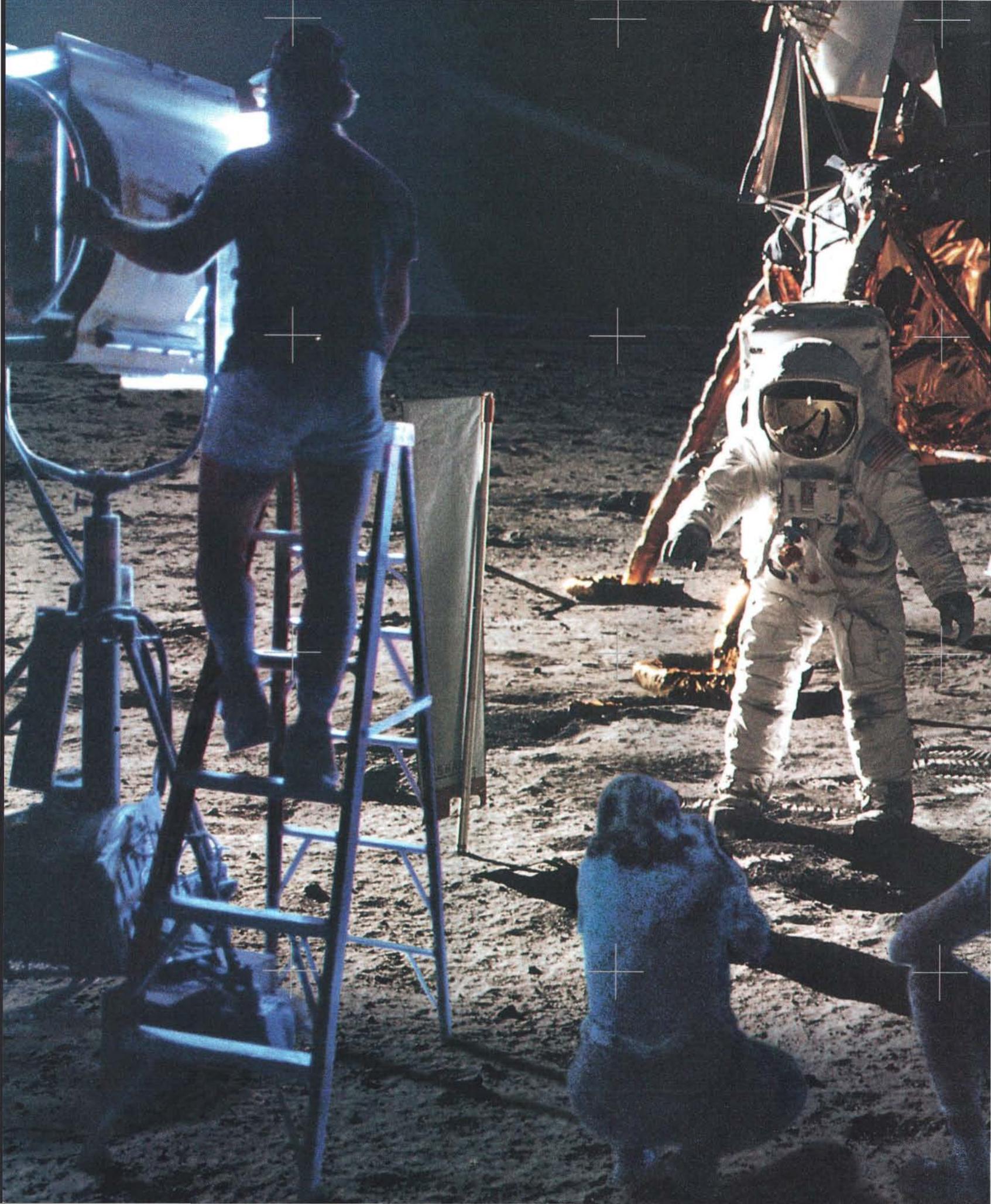
They *may* lead to the brains of artificial intelligence dreams, but I think they will be best put toward patching up the damage between humankind and the environment, replacing the work of damaging chemicals worldwide. That's my goal, anyway. I see them as the components of a programmable ecology. They'll replant forests, hunt cockroaches, monitor poachers, cut your grass, clean your pool, polish your floors – all invisibly, dependably, for years.

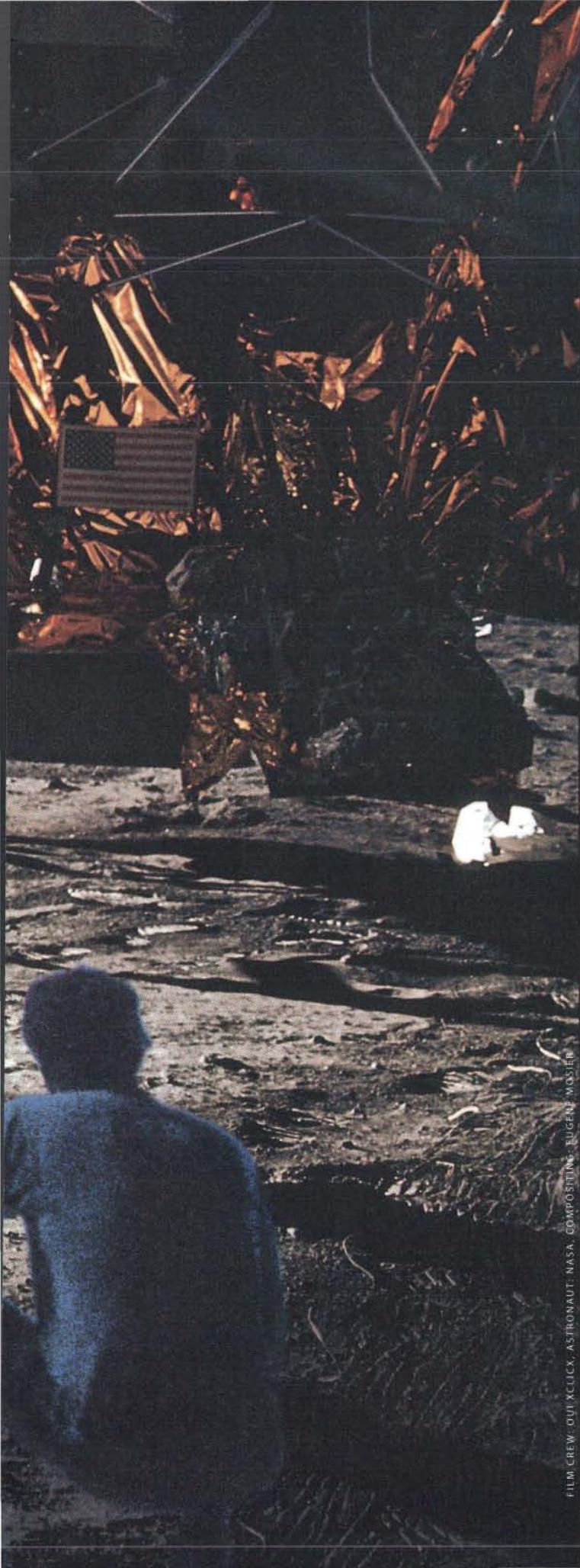
No human droids?

Why would I want to build a person when I can explore unorthodox alien intelligences from the ground up? To borrow from author David Brin, what I like to think I'm doing is proctoring a silicon species into sentience, but with full control over the specs. Not plant. Not animal. Something else. Why wait for the stars when we can build new minds here? Already, they're more surprising than I'd expected. I'm hoping they'll be stranger than we can imagine. ■ ■ ■

The story of robotics over the past four decades is one of complicated machines that don't work – or, anyway, not for long. Canadian roboticist Mark Tilden (currently at Los Alamos National Laboratory in New Mexico) has been trying a different idea: building very simple machines that work continuously, for decades.

Tilden creates small, elegant 'bots by scavenging parts from the jetsam of consumer life: dead calculators, motors from defunct camcorders, discarded toys, and reprogrammed digital chips from singing birthday cards. Wired caught up with Tilden at his Third World Robot Games in Toronto, where, Tilden says, humans act as reproductive agents for robots.





Are you sure we went to the moon 25 years ago? Are you positive? Millions of Americans believe the moon landings may have been a US\$25 billion swindle, perpetrated by NASA with the latest in communications technology and the best in special effects. *Wired* plunges into the combat zone between heated conspiracy believers and exasperated NASA officials.

THE WRONG STUFF

BY ROGIER VAN BAKEL

"Columbia, he has landed Tranquility Base. Eagle is at Tranquility. I read you five by. Over." The voice from Houston betrayed no emotion, although this was anything but business as usual. A human being was about to set foot on the moon for the first time in history, armed only with the Stars and Stripes, some scientific instruments, and an almost reckless, can-do demeanor that had captivated the world.

The reply from Columbia, the command-and-service module that had released the lunar lander 2 hours and 33 minutes earlier, betrayed only equal professional cool. "Yes, I heard the whole thing," Michael Collins said matter-of-factly.

Houston: "Well, it's a good show." Columbia: "Fantastic."

That's when Neil Armstrong chimed in. "Yeah, I'll second that,"

said the 38-year-old astronaut, the moonwalker-to-be, America's own Boy Scout, and the most famous man in the – well, in the universe. And even though the static ate away at the clarity of his consonants, Armstrong's sneering tone came through loud and clear. The mission control man heard it too. And he knew what was coming. Sort of.

"A fantastic show," Armstrong said. "The greatest show on earth, huh, guys?"

There was a moment's silence. Then a cameraman snickered. And the director sighed, and did what directors do when actors screw up their lines. "Cut," he groaned. He was a heavyset man in his 50s, and the combination of the long hours and the hot studio lights had started to get to him.

"Shit, Armstrong, if you're gonna

Anagram enthusiasts will find that Rogier van Bakel (rogiernl@aol.com) has *Brave Ink Galore*. He is a Dutch correspondent in Washington, DC.

be a smart-ass, do it on your own time, all right? We got 25 tired people on this set. We got a billion people who are going to be watching your every move only a week from now. We're on deadline here. Now, do you suppose you could just stick to the script and get it over with? Thank you."

His assistant stepped forward with the slate. "Apollo moon landing, scene 769/A22, take three," she announced.

"Action!"

"Columbia, he has landed Tranquillity Base," the mission control man began again.

Superfraud

The history books lie. So do the encyclopedias and the commemorative videos and the 25-year-old coffee mugs with the proudly smiling faces of Neil Armstrong, Edwin Aldrin, and Michael Collins. When Armstrong got down from that ladder, proclaiming that it was only a small step for him but a giant leap for mankind, he was merely setting foot on a dust-covered sound stage in a top-secret TV studio in the Nevada desert. NASA's cold warriors and spin doctors faked the whole moon landing. Come to think of it, they faked all six moon landings — spending around US\$25 billion to prove to the world that not even the Soviets, especially not the Soviets, could hold a candle to the US when it came to space exploration.

Well, at least, that's the view of writer Bill Kaysing. It's also the conviction of millions of Americans who have learned to distrust their government with a passion. Most of these skeptics don't even appear to be steamed about the alleged superfraud. They shrug and raise their palms and go about their business. Not Kaysing. He seems to have never heard a conspiracy theory he didn't like, and this one tops 'em all. For almost 20 years now, he has been trying to get out "the most electrifying news story of the entire 20th century and possibly of all time." He has written a book aptly titled *We Never Went to the Moon* and won't give up trying to uncover more evidence.

Kaysing, a white-haired, gentle Californian whose energy level seems mercifully untouched by his 72 years, worked as head of technical publications for the Rocketdyne Research Department at their Southern California facility from 1956 to 1963. Rocketdyne was the engine contractor for Apollo.

"NASA couldn't make it to the moon, and they knew it," asserts Kaysing, who, after begging out of the "corporate rat race," became a freelance author of books and newsletters. "In the late '50s, when I was at Rocketdyne, they did a feasibility study on astronauts landing on the moon. They found that the chance of success was something like .0017 percent. In other words, it was hopeless." As late as 1967, Kaysing reminds me, three astronauts died in a horrendous fire on the launch pad. "It's also well documented that NASA was often badly managed and had poor quality control. But as of '69, we could suddenly perform manned flight upon manned flight? With complete success? It's just against all statistical odds."

President John F. Kennedy wasn't convinced at all that the endeavor was next to impossible. In fact, he had publicly announced in May 1961 that "landing a man on the moon and returning him safely to earth" would be a Number One priority for the US, an accomplishment that was to instill pride in Americans and awe in the rest of the world. And so, Kaysing believes, NASA faked it, acting in accordance with the old adage that in a war, the truth is often the first casualty. (Cold wars, he and his fellow conspiracy believers say, are no exception.)

To hear him tell it, NASA had good reason to stage moon landing after moon landing, instead of simply admitting that lunar strolls would have to remain the stuff of science fiction novels, at least for a while. "They — both NASA and Rocketdyne — wanted the money to keep pouring in. I've worked in aerospace long enough to know that's their goal."

Absent Stars

There is an almost instinctive rejoinder to all of this: *but we saw it*. If television ever had a killer app, the moon landing was it. We bought new sets in droves, flicked them on as zero hour approached, and, miraculously, felt ourselves being locked into an intangible but very real oneness with a billion other people. It was our first taste of a virtual community, of cultures docking. It felt good. And now there's this guy telling us that it was all a lie? C'mon! His rockets are a little loose. What proof does he have anyway?

Kaysing points out numerous anomalies in NASA publications, as well as in the TV and still pictures that came from the moon. For example, there are no stars in many of the photographs taken on the lunar surface. With no atmosphere to diffuse their light, wouldn't stars have to be clearly visible? And why is there no crater beneath the lunar lander, despite the jet of its 10,000-pound-thrust hypergolic engine? How do NASA's experts explain pictures of astronauts on the moon in which the astronauts' sides and backs are just as well lit as the fronts of their spacesuits — which is inconsistent with the deep, black shadows the harsh sunlight should be casting? And why is there a line between a sharp foreground and a blurry background in some of the pictures, almost as if special-effects makers had used a so-called "matte painting" to simulate the farther reaches of the moonscape? "It all points to an unprecedented swindle," Kaysing concludes confidently.

But just how could NASA possibly have pulled it off? How about the TV pictures that billions of people saw over the course of six successful missions: the rocket lifting off from the Cape Kennedy launch pad under the watchful eye of hundreds of thousands of spectators; the capsule with the crew returning to earth; the moon rocks; the hundreds, perhaps thousands, of space-program employees in the know who would have to be relied upon to take the incredible secret to their graves?

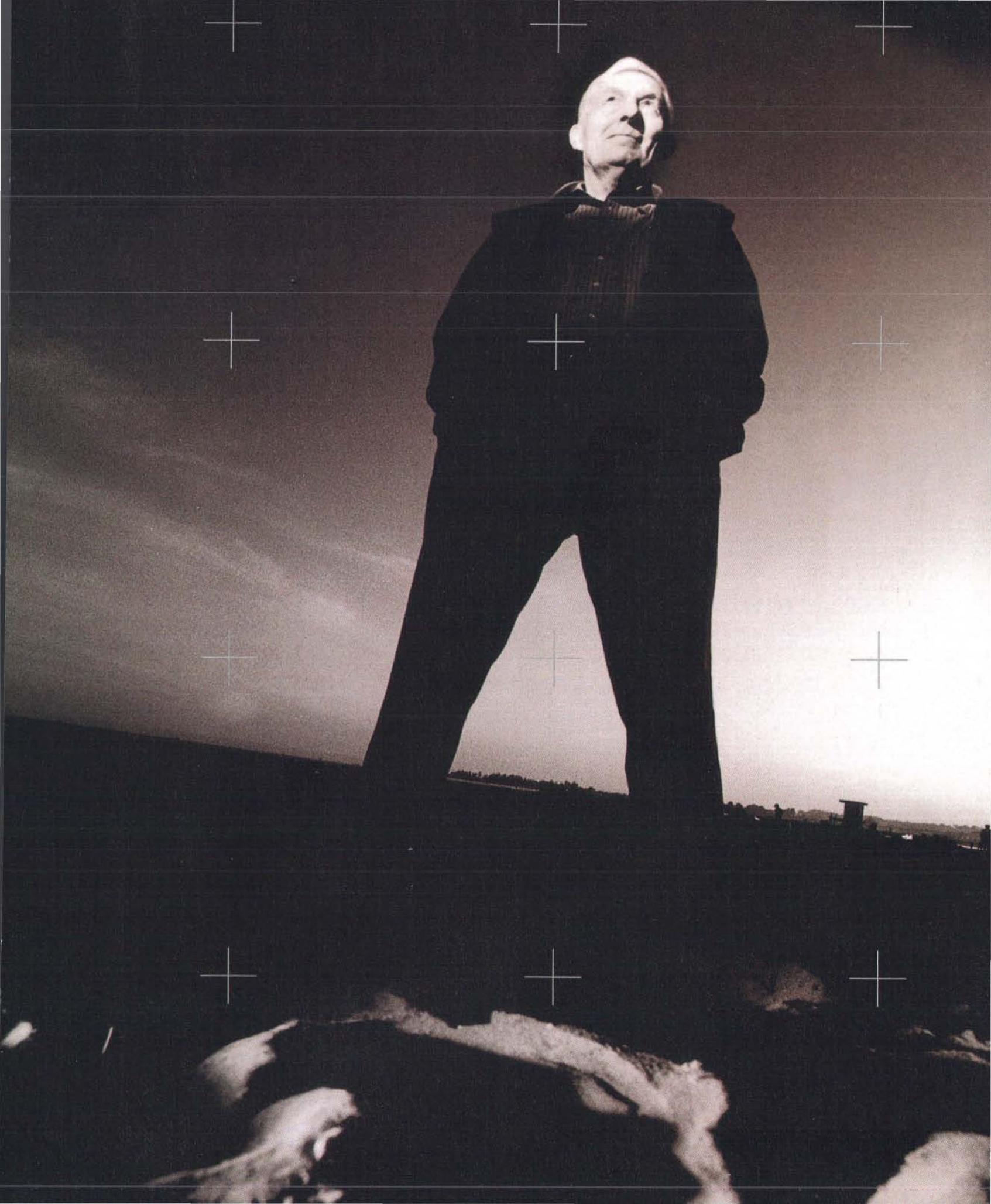
Easy, says Kaysing. The rockets took off all right, with the astronauts on board, but as soon as they

WE NEVER WENT TO THE MOON

by Bill Kaysing



"Shit, Armstrong, if you're gonna be a smart-ass, do it on your own time, all right? We're on deadline here. Now, do you suppose you could just stick to the script and get it over with?" According to Bill Kaysing (right), author of *We Never Went to the Moon*, that may be how it all happened.



NASA Bites Back

Q: Why is there no discernible crater beneath the lunar lander?

A: "Although the descent engine of the LM is powerful, most of its operation takes place thousands of feet above the moon during the early stages of the landing," says a NASA information sheet. "At the moment of touchdown, a small amount of surface dust is blown away, but the relatively cohesive lunar surface seems to deflect the blast sideways."

Q: Why is there an artificial-looking line between a sharp foreground and a blurry background in some of the pictures of the lunar surface?

A: "What you see is simply the curvature of the moon," explains Paul Lowman, a NASA geophysicist. "Because the moon is such a small body, the curvature horizon is only two or three miles away from eye level. That sharp line you see in some pictures is the visible horizon. The blurry part you see is caused by mountains sticking up from beyond the horizon."

Q: Why are there no stars in many of the photos taken on the moon?

A: "That's one of Kaysing's sillier arguments," says James Oberg, a space-flight operations engineer with the space shuttle program. "Go out at night and take a picture of yourself under a streetlight. Even if there's a star-studded sky, you'll see no stars in your picture because the camera was set to properly expose that big lighted object in the foreground – you – and will not register much weaker light sources."

Q: How about the various lighting anomalies?

A: "On some pictures, astronauts are lit from more than one side because the sunlight is reflected off the lunar surface or off the landing vehicle," says NASA spokesperson James Hartsfield. Paul Lowman adds that some conspiracy believers are unknowingly or deliberately using pictures of astronauts that NASA never claimed were taken on the moon. "There are pictures being passed on and published in their circles that appeared in pre-moon landing issues of *Aviation Week* – nothing mysterious about them," sighs Lowman. "These are photos taken in a moon-like training facility at the Johnson Space Center where, indeed, there were several sources of light."

were out of sight, the roaring spacecraft set course for the south polar sea, jettisoned its crew, and crashed. Later, the crew and the command module were put in a military plane and dropped in the Pacific for "recovery" by an aircraft carrier. (Kaysing claims that he talked with an airline pilot who, en route from San Francisco to Tokyo, saw the Apollo 15 command module sliding out of an unidentified cargo plane, but he can't provide the captain's name or the name of the airline.) The moon rocks were made in a NASA geology lab, right here on earth, he continues. Not very many people on the Apollo project knew about the hoax, as they were only informed on a need-to-know basis. Cash bonuses, promotions, or veiled threats could have ensured the silence of those who were in on the whole scheme.

Zero Gravity

Kaysing is not alone in his assertion that NASA has been, um, mooning the public. Bill Brian, a 45-year-old Oregonian who authored the 1982 book *Moon-gate*, agrees that there is "some sort of cover-up." Although Brian thinks that his fellow investigator may very well be right in saying that we never went to the moon, he believes there is an entirely different reason for many of the inconsistencies the two have found. Maybe we did go, Brian says, but it's possible we reached the moon with the aid of a secret zero gravity device that NASA probably reverse-engineered by copying parts of a captured extraterrestrial spaceship. Brian, who received BS and MS degrees in nuclear engineering at Oregon State University (although he now holds a job as a policy and procedures analyst at a utility company), uses his "mathematical and conceptual skills" to reason that the moon's gravity is actually similar to Earth's, and that most likely, the moon has an atmosphere after all. He has crammed the appendices of his book with complex calculations to prove these points, but he trusts his intuition, too: "The NASA transcripts of the communication between the astronauts and mission control read as if they're carefully scripted. The accounts all have a very strange flavor to them, as if the astronauts weren't really there."

But why in the world would NASA feel compelled to cover up knowledge of a high-gravity moon? "It's a cascading string of events," explains Brian. "You can't let one bit of information out without blowing the whole thing. They'd have to explain the propulsion technique that got them there, so they'd have to divulge their UFO research. And if they could tap this energy, that would imply the oil cartels are at risk, and the very structure of our world economy could collapse. They didn't want to run that risk."

As this issue of *Wired* goes to press, a new book is headed to the stores: *Was It Only a Paper Moon*, by Ralph René, "a scientist and patented inventor." Published by tiny Victoria House Press in New York, in what it has announced will be a first run of "at least 100,000 copies," *Paper Moon* supposedly presents

the latest scientific findings regarding the moon landing. René offers data suggesting, among other things, that without an impractical shield about two meters thick, the spacemen "would have been cooked by radiation" during the journey. Ergo, the lunar endeavors were impossible, and were cynically faked at the expense of gullible people everywhere.

Other conspiracy buffs don't doubt that men walked on the moon but call the fact irrelevant because extraterrestrials made it there ages ago – and NASA knows it and has preferred to keep it a secret. In his recent book, *Extra-Terrestrial Archeology*, David Childress points out various unexplained structures on the moon and argues that these might be archeological remnants of intelligent civilizations. Childress, an avid believer in UFOs, also doesn't rule out the possibility that aliens still use the moon as a base and a convenient stepping stone for their trips to our planet. This might even mean, enthuses the author, that the moon is really "a spaceship with an inner metallic-rock shell beneath miles of dirt and dust and rock."

Children and Senators

Although very few Americans subscribe to such grandiose theories, millions of people doubt the authenticity of the lunar missions, much to NASA's exasperation. Over the years, the agency's public services department went through reams of paper answering incredulous schoolchildren, teachers, librarians – and even US lawmakers like former Sen. Alan Cranston (D-California) and Sen. Strom Thurmond (R-South Carolina), who had written to NASA relaying the doubts of some of their constituents. As many as 100 million Americans, says Kaysing, are inclined to disbelieve the whole lunar adventure. Like many of his statements, that one should be taken with a grain of salt: his proof is based on his observation that "almost half the people who phoned in to radio and TV shows" he has been on supported him. That's hardly irrefutable proof.

But when Knight Newspapers (one of the two groups that later merged to form Knight-Ridder Inc.) polled 1,721 US residents one year after the first moon landing, it found that more than 30 percent of respondents were suspicious of NASA's trips to the moon. A July 20, 1970, *Newsweek* article reporting the results of the poll cited "an elderly Philadelphia woman who thought the moon landing had been staged in an Arizona desert" and a Macon, Georgia, housewife who questioned how a TV set that couldn't pull in New York stations could possibly "receive signals from the moon." The greatest skepticism, according to *Newsweek*, surfaced in a ghetto in Washington, DC, where more than half of those interviewed doubted the authenticity of Neil Armstrong's stroll. "It's all a deliberate effort to mask problems at home," explained one inner-city preacher. "The people are unhappy – and this takes their minds off their problems."

Poll or no poll, even James Oberg, a nemesis of

Kaysing, conservatively estimates that the disbelievers may number between 10 and 25 million Americans.

Oberg works for NASA contractor Rockwell International as a space-flight operations engineer with the space shuttle program. He writes as a second profession, covering all aspects of space activity, with a special interest in space folklore. Myths have a way of blossoming in the fertile soil of scientific discovery, Oberg notes. "Every age of exploration is the same in that respect – from the time of the Phoenicians... to Marco Polo, and including mermaids and unipeds and all these mythological creatures that lurk at the edge of our exploration. To me, it's extremely humanizing to have this typically human reaction – this denial, this myth making – to our lunar adventure. I'm not at all surprised that these stories or interpretations exist. Actually, I'm surprised they aren't more widespread."

Nonetheless, hoax believers can be found in many parts of society, here and abroad. According to Oberg, Cuban children are officially taught that Yankee space technology failed miserably and that NASA was reduced to pitifully faking every single lunar landing. Some New Agers also contest the possibility of moon landings, as do Hare Krishnas. Non-mainstream Christians at the Flat Earth Society – a Lancaster, California-based anti-science group of about 3,500 members – contest the entire field of astronomy (not to mention moon landings). They liken the towering launch pads to the Tower of Babel.

The eccentricity of such convictions certainly intrigues Oberg. "I respect these people's dedication to their view of the world. One reason they fascinate me is that they're a constant reminder to me that we can't rest on common knowledge, we can't be complacent with our traditional interpretations of things – even though these interpretations are almost always right. But I also find their pathology of reasoning, or non-reasoning, compelling. We define health by the boundaries of pathology, and I try and define rational thought by looking at cases that go over the edge."

That's damning praise indeed. So it's no surprise that Bill Kaysing doesn't much care for James Oberg, whom he dismisses as "a NASA agent."

Good Timing

If NASA had really wanted to fake the moon landings – we're talking purely hypothetical here – the timing was certainly right. The advent of television, having reached worldwide critical mass only years prior to the moon landing, would prove instrumental to the fraud's success; in this case, seeing really was believing. The magic of satellites, with their ability to enable live global (and interplanetary?) communication, fascinated and awed millions of people, much like anything atomic had caught the public's fancy in the previous decade. Also, space research and rocket science had advanced far

enough to make a trip to the moon likely – or, at the very least, remotely feasible. "The structural nature of technology had changed to make the moon landing possible, but that also made it possible for people to doubt it," says Gary Fine, a sociology professor at the University of Georgia in Athens specializing in rumor and contemporary legend.

Perhaps more importantly, Watergate hadn't happened yet, and people still trusted their elected officials. "A distrust of authority clearly plays into this whole thing," argues Fred Fedler, who teaches journalism at the University of Central Florida and has written a book on media hoaxes. "With Vietnam and Watergate, people have become less trusting, and to some people it doesn't matter what the government says; their immediate reaction is to disbelieve and to sometimes embrace the opposite view."

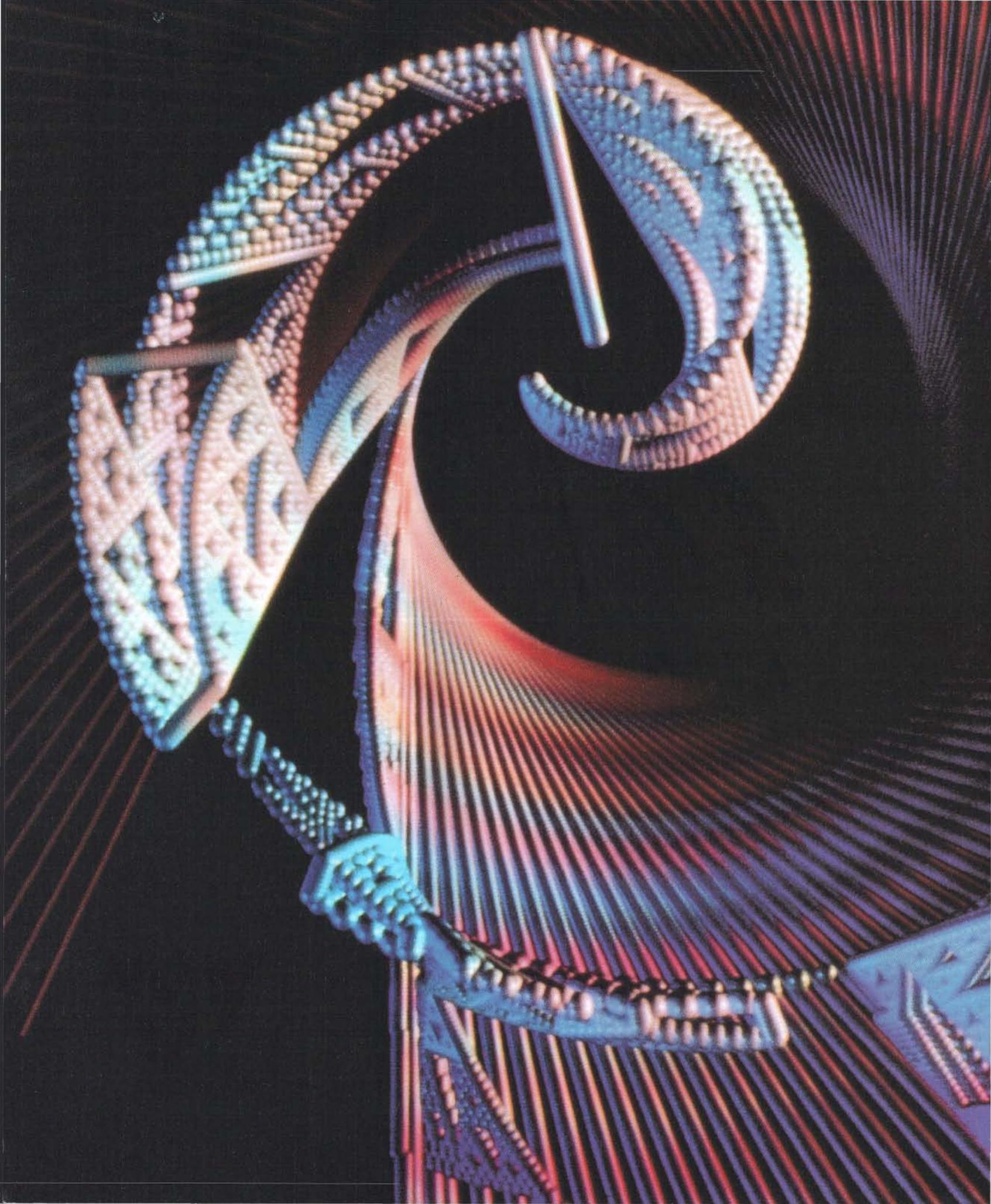
The distrust continues to be fed by the mass media, especially in the film and TV business. It is rare to find a movie in which a government agency is actually depicted as a collection of fairly efficient, competent people who serve their country to the best of their ability. Dramatically speaking, an élite of sinister, evil bureaucrats is much more appealing. Linda Degh, a retired folklorist who taught at Indiana University in Bloomington, and who has recently published a book titled *American Folklore and Mass Media*, is reminded of the film *Capricorn One*. Released in 1978, *Capricorn One* tells the story of a staged flight to Mars. The astronauts grapple with the moral implications of the giant charade and fear they might be killed to keep them from blowing the whistle. Sure enough, they find themselves hunted down by bloodthirsty government thugs; only one of the astronauts makes it to freedom and reporters' microphones. Degh recalls that it was "quite a slanderous movie, pretending that the government had been killing people," and she believes that it must have given a powerful boost to the moon-landing hoax theory. "The mass media catapult these half-truths into a kind of twilight zone where people can make their guesses sound as truths. Mass media have a terrible impact on people who lack guidance."

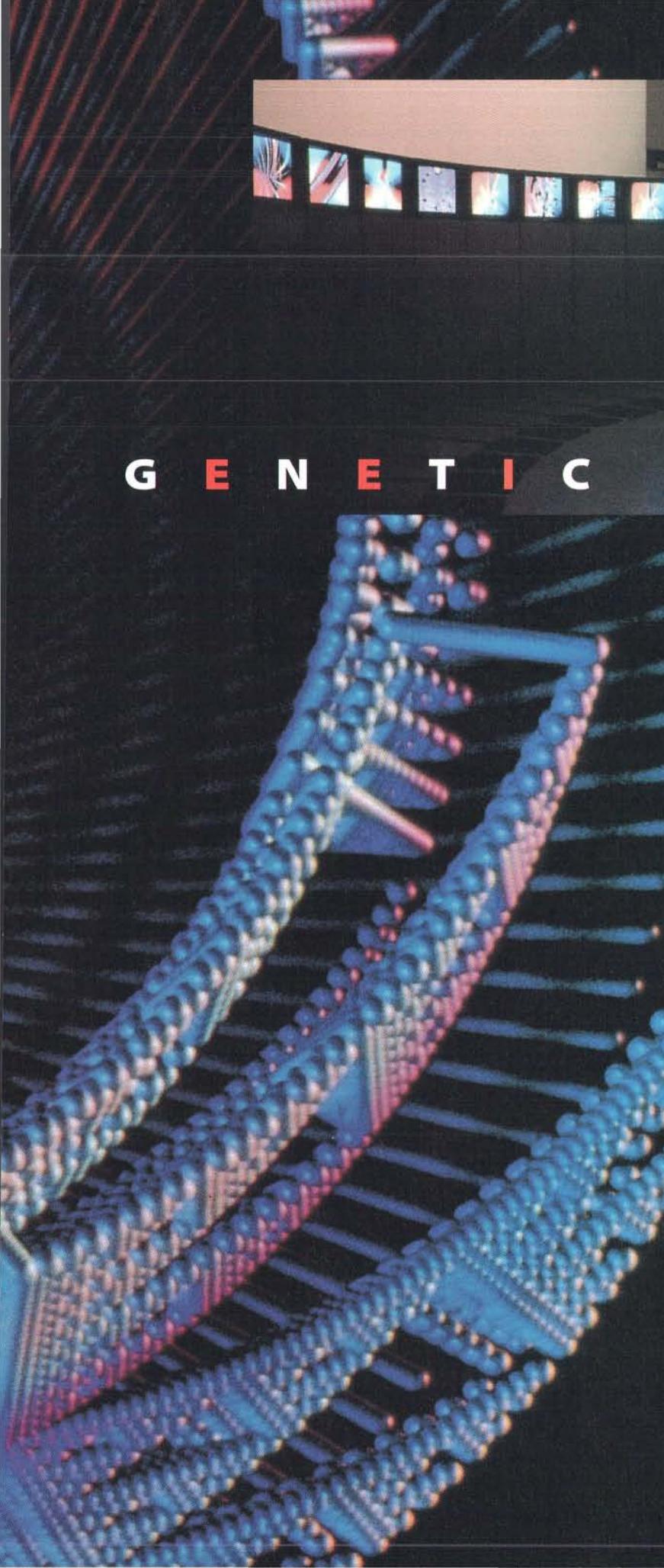
007 Uncovers Hoax

Peter Hyams, *Capricorn One*'s director, agrees that mass media can be very powerful – dangerously so, in fact. "My parents believed that if it was in *The New York Times*, it was true. I was part of the generation that grew up believing that if we saw it on television, it was true. And I learned how inaccurate newspapers were, and I realized that TV is just as inaccurate, or it can be. So I said, wouldn't it be interesting if you took a major event where the only source that people have is a television screen, and you showed how easy it would be to manipulate everybody." Hyams insists that he made *Capricorn One* "for entertainment, for fun," not because he was making not-so-veiled references to the alleged 155 ▶



If television ever had a killer app, the moon landing was it. We bought new sets in droves, flicked them on as zero hour approached, and, miraculously, felt ourselves being locked into an intangible but very real oneness with a billion other people.





GENETIC IMAGES

There are two ways to make complex things. One is to design them; the other is to evolve them. Of the two methods, only evolution brings us things that are literally beyond our imaginations.

Karl Sims uses the new power of parallel processing supercomputers to harness evolution to create visual images. Sims breeds pictures on a Connection Machine made by the Cambridge, Massachusetts-based Thinking Machine.

His interactive image evolution software is composed of logical parts that can be assembled in many ways. Each logical "primitive" designates a form function, such as sine or cosine. These bits of equations act as "genes" that paint a picture. Any random mixture of genes will produce a picture of some sort. Because a small change in the gene formula alters the form of the whole image rather than merely a few pixels (just as changing a few genes in an organism can alter far more than a few cells), the "space of all possible pictures" can be traversed rapidly by moving from one picture variant to the next.

Sims devised an art installation called "Genetic Images" that allows museum visitors to breed images of their own choosing. (The setup shown

above is at the Centre Pompidou in Paris, it has also been shown in Linz, Austria.) Sixteen monitors arranged in a graceful crescent display 16 random variations of an image. Each monitor has a foot switch in front of it. A viewer selects a "parent" image by running over and stomping on the pad beneath its display. The selected image instantly breeds 16 similar but slightly variant offspring, and these appear on the monitors for the next round of choosing.

Successive rounds of *choose*, *vary*, and *choose* generate images of unbelievable beauty. Sit on a bench before the arc of monitors and watch these forms appear and then disappear, never to be seen again: you will be struck by how dissimilar they are to both human designs and the designs of biology. As this example (selected from pictures bred by museum visitors) shows, these mirages are of an alien beauty. They are the daydreams of machines.

This art is a joint product of breeding machine and human gardener. Sims sees a future for artists as agents who don't create specific images, but instead create novel processes for generating new images. The artist becomes a god, creating an Eden in which surprising things will grow. —Kevin Kelly



By James Der Derian

Cyber-Deterrence

What happens when you combine media voyeurism, technological exhibitionism, and strategic simulations?

Wired visits the digital battlefield of Desert Hammer VI and the Advanced Warfighting Experiment (AWE) to see whether the US Army can win the next war without firing another shot.

I missed the first yellow warning sign. It was dark, I was on a 40-mile, dead-end road into the heart of the high Mojave Desert, and I was running late. Not wanting to give the public affairs officer another opportunity to explain what o-five-hundred meant, I pushed the rental car up to 90. A few miles later there was a second sign. This time I put on the high beams and slowed down. On it was a black silhouette of a tank, and underneath, "Tank Xing."

I had reached Fort Irwin, California, site of the US Army's National Training Center. Created in 1980, its purpose is to take the troops as close to the edge of war as the technology of simulation and the rigors of the environment will allow. For three weeks in the spring of 1994, this 635,052-acre military base served as the testing ground of the first fully digitized task force, one element of the 194th Separate Armored Brigade from Fort Knox, Kentucky.

Digitally enhanced, computer-accessorized, and budgetarily gold-plated from the bottom of their combat boots to the top of their kevlars, soldiers of the 194th Brigade were here for Desert Hammer VI. Also known as the "digital rotation," this experimental war game was developed to show the top brass, a host of junketing members of Congress, and an odd mix of journalists how, in the words of the

press release, "digital technology can enhance lethality, operations tempo, and survivability." Combining real-time airborne and satellite surveillance, digitized battlefield communications, helmet-mounted displays, a 486 computer for every warrior, and an array of other high-tech weaponry, the brigade had come wired to move faster, kill better, and live longer than the enemy. If the old nuclear deterrent was to depend on the frightful force of mass destruction, the new digital strategy is to win the total information war.

Back when messages traveled at the speed of a horse, and overhead surveillance meant a view from a hilltop, Prussian strategist Carl von Clausewitz warned in *On War* against the arrogance of leaders who thought scripted battles would resemble the actual thing: "All action must, to a certain extent, be planned in a mere twilight, which in addition not infrequently – like the effect of fog or moonlight – gives to things exaggerated dimensions and an unnatural appearance." Would digitization render von Clausewitz's famous

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The "21st Century Land Warriors" are digitally enhanced, computer accessorized, and budgetarily gold-plated from the bottom of their combat boots to the top of their kevlars.



dictum obsolete? Would today's commanders be able to use satellite tracking and computer-equipped soldiers to dispel the fog of war? After three days, I thought I knew the answer, but by then the question had changed.

Almost every US unit that fights at Fort Irwin goes to battle against the "Krasnovians," American soldiers serving in a simulated Soviet brigade. When global crises dictate, the Krasnovians can also take on the role of "Sumarians" (Iraqis) or "Ham-chuks" (North Koreans). On the first day of Desert Hammer VI, I chased black-bereted Krasnovians through the Whale Gap, into the Valley of Death, and watched them kick American desert khaki all the way to the John Wayne Hills.

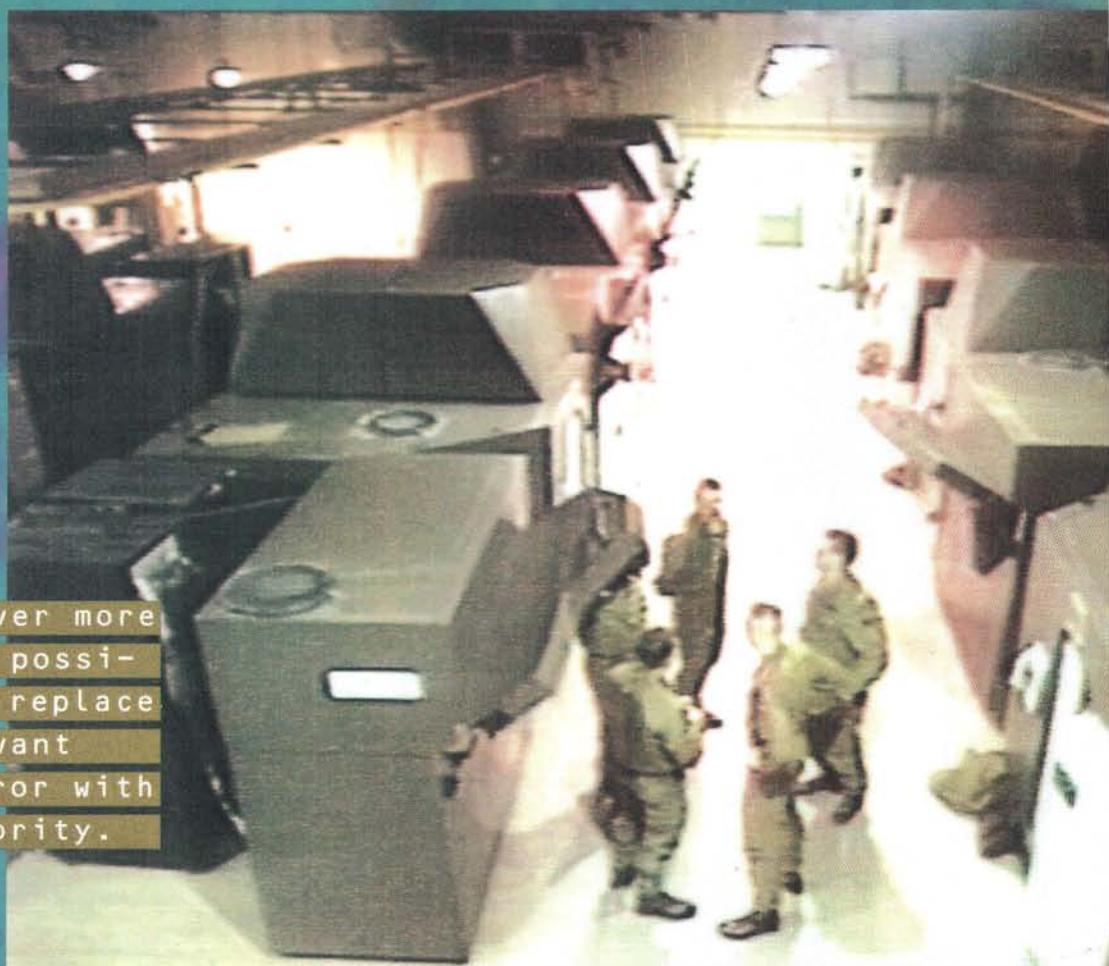
On paper, the digitized army's combination of brute force and high tech appeared formidable. At the high end of the lethality spectrum, the Americans had top-of-the-line M1A2 Abrams main battle tanks, each carrying an information system that collected real-time battlefield data from airplanes, satellites, and unmanned aerial vehicles. At the low end were the "21st Century Land Warriors" (also called "warfighters" but never "soldiers" or "infantry") who came equipped with day- and night-vision scopes mounted on their M-16s, video cameras, and 1-inch LED screens attached to

their kevlar helmets. The 486 computers in their rucksacks were wired to radios that could send voice or digital-burst communications to a battle command vehicle coordinating the attack through a customized Windows program.

Fort Irwin's public affairs officers were equally well armed. With budget cuts clearly on their minds, our voluble handlers, equipped with glossy brochures, informed us more than once that "smaller is not better: better is better." Other slogans sounded like a hybrid of Nick Machiavelli and Bill Gates, promising to "Win the Battlefield Information War" and "Project and Sustain the Force." One major went so far as to speculate, "If General Custer had digitization, he never would have had a last stand." Analogies proliferated like mad: digitization is the equivalent of the addition of the stirrup to the saddle or the integration of helicopters into the Army.

However, when the motto miasma met the fog of war on the first day of battle, the fog seemed to win out, especially since it came amply supplemented by sand, dust, and smoke. Our personable handler, a Major Franklin Childress, attempted to narrate the battle as it unfolded. After leading our small convoy of three humvees to a fine hillside perch, he provided a running commentary on what we could see and also on what we could hear as we eavesdropped on the radio traffic. We overheard accounts of confusion and of fratri-

Digitization, making ever more convincing simulations possible, seems destined to replace an increasingly irrelevant nuclear balance of terror with a simulation of superiority.



cide or "friendly fire." Although no one in the military would go on record about how the war game had commenced, a defense industry rep let me know later that the first blow had been delivered by an unarmed cruise missile launched off the California coast. Fortunately for the residents of Las Vegas, the missile had stayed on course and landed on the live-fire range.

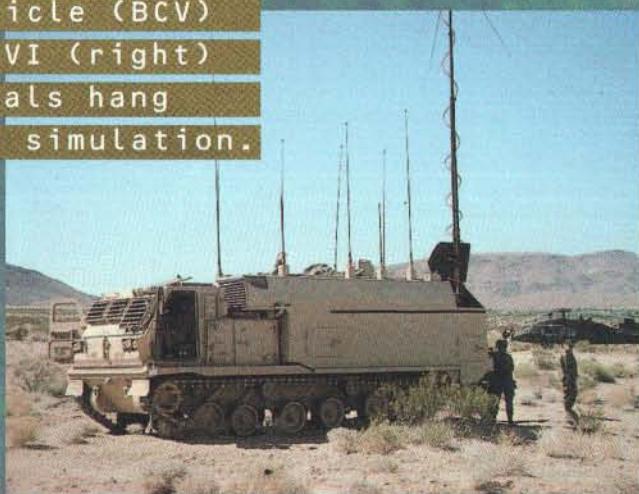
Our first visible sign of the battle came when an array of Black Hawk and Apache helicopters flew by so low that we could look down on them from our hillside perch. Some were pretending to be Soviet Hinds, and my first thought was of the helicopters shot down over Iraq on April 14, the week before my visit, in a deadly, real-life case of "friendly fire." I filed away my question as an F-16 followed the helicopter, sweeping over our hill and dropping flares to confuse possible ground-to-air missiles. Had the pilots who shot down the helicopters been trained to attack American Blackhawks pretending to be Soviet Hinds?

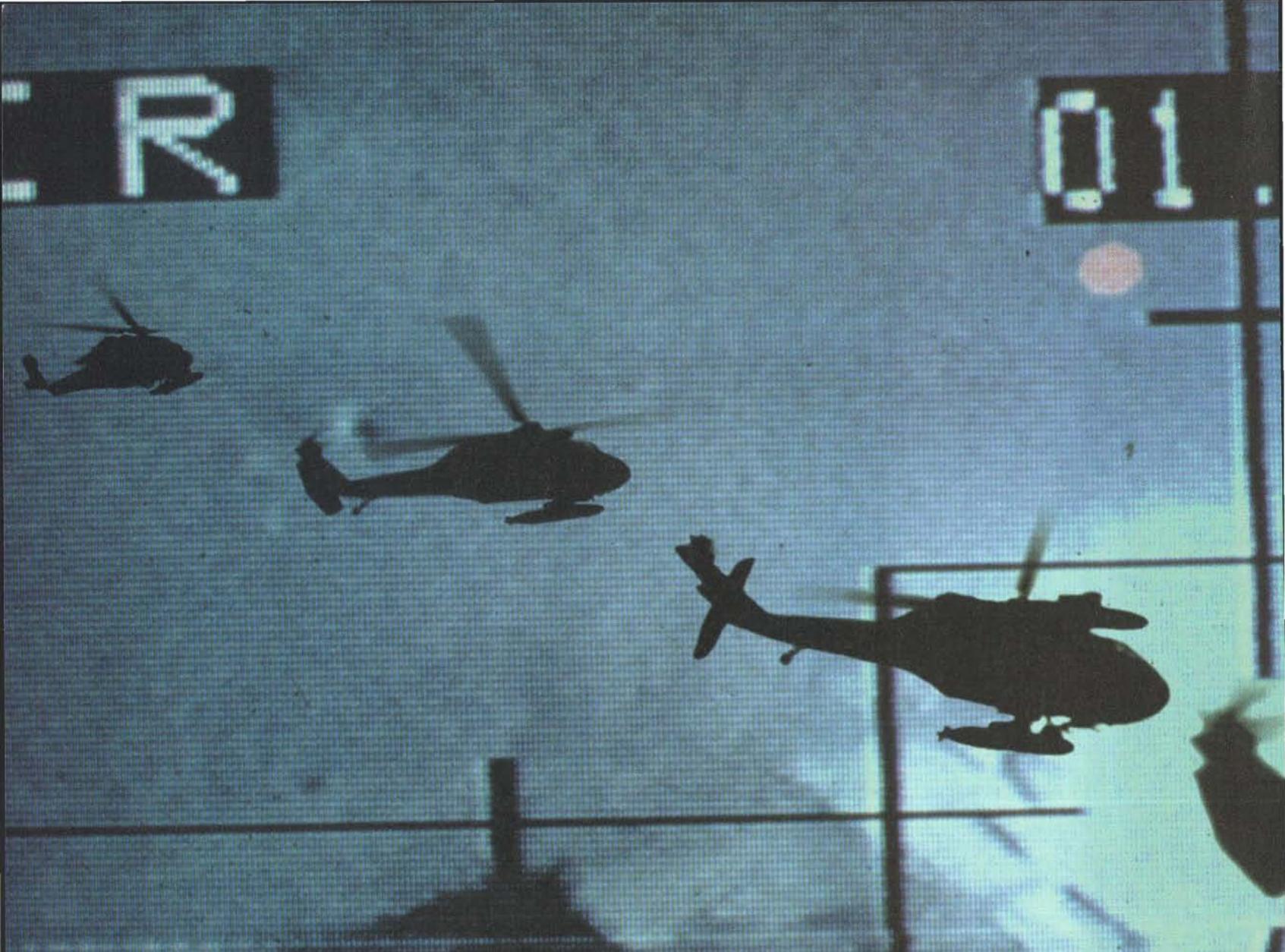
The confusion increased as loud bangs joined the visuals. An M-22 simulator round the size of a fat shotgun shell exploded nearby as a Stinger missile crew fired at an F-16 fighter plane. White plumes from the blank Hoffman shells that simulate tank and artillery fire spread across the battlefield. The arrival of the main show was signaled by tracks of dust on the horizon. Tanks,

humvees, and armored personnel carriers came out of the wadis in bursts of speed. As the Krasnovians mixed it up with the Americans, vehicles bearing the orange flags of the observer-controllers darted in and out of the battle, tallying the kills. Rather than loaded weapons, they depended on the MILES, or Multiple Integrated Laser Engagement System, first developed by Xerox Electro-Optical and now better known to civilians as laser tag. Hits and near-misses were recorded by the electronic sensors on the vests and belts that circled soldiers and vehicles alike, and transmitted via microwave back to computers at "Star Wars," the command center. From our hillside we could see the flashing yellow strobes of the MILES sensors spread across the battlefield as the Krasnovians cut through the American forces. Simulation-hardened and terrain-savvy, the Krasnovians rarely lose.

Suddenly we got an order to move: our position was about to be overrun. For a brief moment, as the Krasnovian tanks came down the ridge, I became separated from the other observers and stood within smelling distance of the tanks as they roared between us. With synapses firing and hormones mixing into a high-octane cocktail, I sensed the seductive rush that comes with simulated war. I was detached and yet connected to a dangerous situation through a kind of voyeurism, as if I were watching myself watch the tanks

The 194th Separate Armored Brigade in Fort Knox, Kentucky, includes formations of tank simulators (left). The Battle Command Vehicle (BCV) for Desert Hammer VI (right) is where the generals hang out, directing the simulation.





bear down. Perhaps therein lies the hidden appeal of simulation: it enables soldiers to espouse death in a fictitious borderland where fear and fun, pain and pleasure, you and the enemy encounter one another. The simulated battlefield makes dying and killing less plausible, and therefore more possible.

Day two began like the first: late and in the dark. But this time I did catch the icon on the first yellow warning sign. It was of a tortoise. One more question for the major.

The main group had already left. A humvee was waiting and ready to catch up to the media convoy. The new driver, however, failed to inspire much confidence. He was unable to make radio contact with Major Childress and kept switching frequencies, until I suggested that he put up the antenna. He kept getting the radio messages wrong, at one point even slowing down to check for a flat tire because he heard the humvee ahead inform the major that it had one.

After a cross-country shortcut through a minefield (marked by round plastic bowls that looked like doggie dishes) and a couple of wrong turns, we caught up with the rest of the group at what appeared to be a desert rest stop for 21st century warfighters. I was first directed to a medical unit, simulating the latest in "tele-medi-

cine." Each soldier in Desert Hammer carried a 3.5-inch computer disk in a breast pocket, not to stop a bullet but to store a digitized image of a predestined wound. In a real war in the near future a video camera would record the body damage. In this case the medic popped the disk into a portable PowerBook to discover that his victim had a sucking chest wound. The image was digitized and transferred via a radiolink to a triage unit in the rear, where a doctor talked the medic through the treatment of the wounded soldier. It seemed to work: the soldier got up and walked away from the stretcher as I moved on to another station.

Standing in the sand next to a Bradley was a borg. He was made of flesh and metal and looked like he had just walked off the set of Star Trek: The Next Generation. He had his Sony minicam, his eyeball-sized display screen, his portable 486, and his global-positioning-system antenna on his helmet. When I asked him if he realized he was a dead ringer for one of the tough colonial marines in Aliens, he curtly answered: "I don't know about that, Sir." (When talking to soldiers, all journalists enjoy an instant field promotion to officer.) I was taken aback, but later surmised that I had transgressed rule Number One of the armed services: never, never confuse an Army grunt, especially a fully digitized grunt, with a Marine no-neck. It seemed that all the hype we were hearing about joint operations

The effect of Desert Hammer is to turn von Clausewitz on his head. Military maneuvers are no longer about dispelling the fog of war, but about stage-managing the special effects.

was only slowly making its way down the ranks.

Judging from some of the thousand-mile stares I got during this and other interviews, the simulated battle in the Mojave Desert had managed to replicate at least one of war's primary characteristics: fatigue. Surprisingly often, soldiers responded to my questions about the reality factor in simulations with the claim that the Persian Gulf War was much easier than this. Technology has advanced quite a bit in a few years. Keeping up with machines is dirty business.

The final stop on the digital tour was an M1A2 tank. I took a few pictures and started to walk away but was stopped by the hovering Major Childress, who asked, "Do you want to take a look inside?" He surely registered my surprise. Three years ago, just after the Gulf War had ended, I came out to the desert to look at the training that was said to have won the war. At the time I was told that I could take pictures of just about anything — except for the inside of an M1 tank, which remained classified. Now, I was invited to videotape a state-of-the-art model. A gunner walked me through the cyberspaces of the Inter-Vehicular Information System: "Here, your position is triangulated by satellite, an enemy targeted by laser range finding, and a friendly identified by a relay from a J-STAR flying overhead."

I was impressed but also confused. What was the reason for this

new policy of access? I asked my standard stock of questions: Would the friction of war overheat a cybernetic battle plan? Would the surge of information overload the digital systems, especially the primary information node of the battle network, the warfighter? Would the new technology further distance the killer from the business of killing? In response I received off-the-shelf, by-the-book answers: perhaps, but not so far — and, besides, this is all in the experimental stage.

However at some point — I think it began with the tour of the tank — I began to suspect that I was asking the wrong set of questions. The Army has always prided itself on being grounded in reality. Now, like the Navy and the Air Force before it, the Army is leaping into a realm of hyperreality, where the enemy disappeared as flesh and blood, and reappeared, pixelated and digitized on computer screens in kill zones, as icons of opportunity. Was there a paradox operating here, that the closer the war game was able to technically reproduce the reality of war, the greater the danger of confusing one for the other? When soldiers begin to mutate into cyborgs, the old questions seem irrelevant.

The transitional moment was the Gulf War. Although General H. Norman Schwarzkopf has always referred to himself as a "mud soldier," in 1990 he sponsored a war game called Exercise Internal

Look '90, which combined computer simulations with minimal troop movements to model an Iraqi invasion. During the final days of the exercise, reality caught up with the simulation and Iraq actually invaded Kuwait. In his autobiography Schwarzkopf recounts that his planners kept mixing up reports of the simulation and the war. It turns out that the mud soldier was our first cyberpunk general.

The blurring of war and simulation goes back even further in the history of Operation Desert Storm. In a 1990 USA Today interview, Schwarzkopf revealed that before the war, Iraq was running computer simulations and war games for an invasion of Kuwait. During the war, Schwarzkopf, according to his own account, was programming daily computer battles against Iraq.

Among the many causes of the Gulf War, what importance should we place on the proliferation of simulations? Have new improved simulations begun to precede and engender the reality of the wars they are intended to model?

Clearly the Army doesn't read French critics like Jean Baudrillard or Paul Virilio for answers about the potential hazards of global simulation at digital speed. But what do they read? The day before my departure I had received an air-express package from the Office of the Secretary of the Army. Officially it was identified as the press kit for the Advanced Warfighting Experiment (AWE). But "press kit" does not do this document justice. Collected in a large, three-ring binder with the triangle logo for "The Digital Battlefield" on the cover (satellite, helicopter, and tank in each corner, connected by lightning bolts to a warfighter in the middle) were more than 30 press releases, brochures, and articles on the Army of the future. Computer-generated images were mixed in with all kinds of fonts and graphics.

Leading the paper charge was a prolegomenon from the office of the Chief of Staff that provides the best encapsulation of the rationale behind the 21st Century Army, Force XXI:

"Today the Industrial Age is being superseded by the Information Age, the Third Wave, hard on the heels of the agrarian and industrial eras. Our present army is well-configured to fight and win in the late Industrial Age, and we can handle Agrarian-Age foes as well. We have begun to move into Third Wave warfare, to evolve a new force for a new century."

In the slickest brochure, bearing the short yet pretentious title, "The Vision," I found a section called "Exploit Modeling and Simulation" that read like a good cyberpunk novel:

"Ten thousand linked simulators! Entire literal armies online, Global real-time, broadband, fiber-optic, satellite-assisted, military simulation networking. And not just connected, not just simulated. Seamless."

It gets better, and for good reason: it was 158 ▶

The Fantastic Four Movie You'll Never See

When *The Thing* roared "It's clobberin' time!" comic-book readers knew that *The Fantastic Four* – superheroes Mr. Fantastic, *The Thing*, The Invisible Girl, and The Human Torch – would pulverize whatever evil menace threatened humankind. But "clobberin' time" came for Roger Corman's movie version of the Marvel Comics classic before it even hit the big screen.

Budgeted at a paltry US\$2 million, the special effects-laden film was set to premiere this year. Charity events tied to openings were scheduled. Trailers appeared in movie theaters. And along with director Oley Sassone, the actors embarked on a promotional tour for the film.

But *The Fantastic Four* disintegrated before film critics could whip out their notebooks.

German producer Bernd Eichinger and his Neue Constantin Films, which purchased the movie rights from Marvel, sublicensed the rights to producer and B-movie king Corman in 1992. Shortly after the film was completed, Eichinger paid Corman \$1 million to repossess the rights.

The \$2 million version was shelved so that 20th Century Fox and *Home Alone* director Chris Columbus could make a flashier \$50 million-plus version with celebrity actors.

"They showed a total disregard for the people involved," said director Sassone. "We had a good film, for what we had to work with."

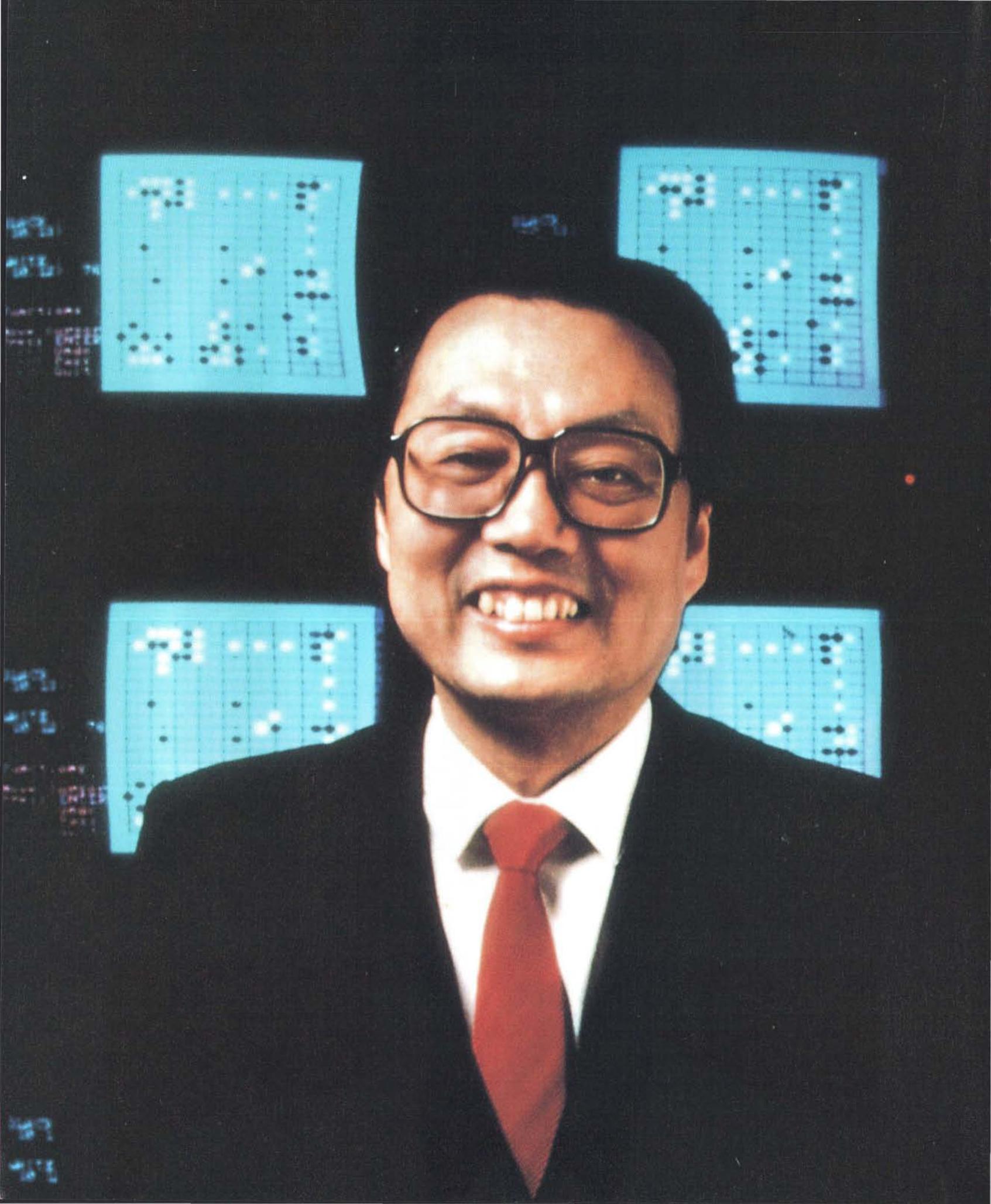
Since Corman's film was nixed (though bootlegged copies are sure to surface), here's a peek at the superhero movie's special effects, created by Mr. Film, a Southern California-based film production company considered a pioneer in computer animation.

The film's technically challenging scenes include one in which Johnny Storm transforms into The Human Torch and prevents Doctor Doom's deadly laser beam from destroying New York. To make it, the actor stepped into a full body suit complete with motion sensors – the same type used to track a player's movements in a virtual reality game. The sensors transferred the actor's movements to a computer-generated representation of a man ablaze.

Audiences may miss the flashy graphics, but they'll also be spared an insipid movie with sappy dialogue and an irritating Invisible Girl character whose role consists of sewing uniforms and making goo-goo eyes at Mr. Fantastic.

Flaws aside, Chris Walker, president of Mr. Film, still hopes that moviegoers will someday see and hear Johnny Storm utter the words, "Flame on," even if it's not his film. Says Walker: "The fans deserve it." – Sheila Muto





**In making Acer a global computer
brand currently growing at 70 percent a year,
the Clone King of PC Island, Stan Shih,
Me-Too
Is Not My Style
has become a national hero in
Taiwan and the most successful information
technology entrepreneur in Asia.**

By Bob Johnstone

It was while eating a Chinese meal in Mexico that Stan Shih, Taiwan's Number One digital entrepreneur, realized personal computers could be marketed like fast food.

Stan – as everyone always calls Acer's chair and CEO – has to travel a lot: his company, Acer, makes the leading brand of PC in Mexico and has facilities in 24 other countries. Wherever he goes, Stan likes to eat Chinese food, but the quality of the cooking varies greatly from place to place. Now, Stan is a pragmatic man. While pondering how the operating principles established by the likes of McDonald's might be applied to his beloved national cuisine, he made the connection between burgers 'n' fries and boards 'n' drives.

Few industries move faster than the personal computer industry: the product cycle for desktop machines these days is narrowing, down to just a few months. That means makers can easily get burned by excess inventory – who wants yesterday's disk drives? Instead of putting together fully loaded PCs in Taiwan and then shipping them worldwide, Stan figured it would make more sense to configure machines downstream to suit local tastes. Final assembly could be delegated to Acer's standardized production lines – 16 different sites worldwide – and components could be sourced according to shelf life. Under this scheme, computer housings and floppies could be shipped to franchises by sea, motherboards flown in fresh from Taiwan, and the most perishable parts – CPUs, hard disks, and memory chips – sourced locally. The result cuts inventory shelf life in half, from 90 to 45 days, and customers can have it their way – at McAcer's.

Stan's plan seems to be working. In 1993, Acer grew 60 percent, scoring sales worth US\$1.9 billion. In the first quarter of 1994, sales

were up 70 percent, to US\$650 million, boosting Acer into 10th place among PC vendors in the US. For the full year, Acer predicts sales of US\$2.7 billion. Prospects for the next three to five years also look good, as companies continue to downsize, replacing their mainframe and minicomputers with networks of PCs. Acer's dream is to break into the top five PC vendors by 1996 and to reach sales of US\$8 billion by the year 2000. A tall order perhaps, but people have scoffed at Acer's lofty ambitions before – and each time Stan has proved them wrong.

There was his controversial 1987 decision to establish a global brand name, for example. Stan spent heavily to transform his company from an anonymous manufacturer of original equipment for big US and European firms into Acer, a brand registered in more than 100 countries around the world with a fancy logo to match. This was a step that no other Taiwanese computer manufacturer had been bold enough to take; back home, locals accused Stan of hubris. (The Latin *acer* means – among other things – active, energetic, and incisive, but the gambler's interpretation of "ace" also resonates well in the risky PC business).

Heads shook again two years later, in 1989, when Stan decided to invest US\$185 million in a joint venture with Texas Instruments Inc. to make memory chips. Taiwan didn't do DRAMs, ran the conventional wisdom. Huge Japanese and Korean conglomerates would kill them in the market if they tried. But Stan had read his tea leaves right, foreseeing the huge increase in demand for memory that Windows 3.0 would create. Since coming online in July of 1991, TI-Acer Inc., located at Hsinchu Science-based Industrial Park in Taiwan, has begun spitting out DRAMs round the clock, breaking records for productivity and generating healthy profits in the process. Acer provides capital to TI-Acer, and in return gets half the factory's output of memory chips.

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as well as access to advanced semiconductor manufacturing.

Whatever Acer does is big news in Taiwan – it is by far the biggest PC maker there, with Mitac running a distant second. (In 1993, according to the island's Institute for Information Industry, Taiwan earned 47 percent of total Asian PC industry revenues of US\$7.6 billion. Japan earned 38 percent, and South Korea earned 14.5 percent. In addition to personal computers, Taiwanese firms also have shares of between 30 and 80 percent of the world markets for computer power supplies, monitors, keyboards, scanners, and mice.)

Stan himself is a national hero, king of "PC Clone Island." *Fortune* has called him "one of the 25 people you ought to know for doing business in Asia," and *MicroTimes* has said he is one of the 100 most influential people in the US information industry.

Stan has become the standard-bearer of Taiwan's electronics industry because he has been with it since the beginning, always leading the way. As a senior in high school, he opted for electrical engineering instead of medicine, the choice, he says, of 80 percent of his classmates. "I didn't want to do what everyone else did," Stan says. "Me-too is not my style."

Beg pardon? If Stan Shih is such an original, then what is he doing cranking out clones, which has to be the ultimate me-too business? Stan would probably answer that there is a world of difference between making clones and making compatibles. By definition, a clone allows no room for differentiation, whereas a compatible offers all sorts of chances for a canny maker to add value. Take speed to market, for example: in 1986, Acer was second only to Compaq – and ahead of IBM – in introducing a 386-based machine. And take original technology: in 1991, Acer introduced a socket called ChipUp,

which makes it easy to upgrade your system with a faster processor. Acer has since licensed ChipUp to dozens of other companies, including Intel (and sued several Taiwanese clone merchants for infringing on its intellectual property).

But no matter how fast you are on your feet and how much technosavvy you can muster, success in such a savagely competitive market as PCs ultimately depends on strategy. And it is in this domain that Stan's true originality resides.

Stan's innovations in corporate style have pushed Acer to the top. And by demonstrating that it is possible to transcend the limitations of the traditional, family-based Chinese company – in which the boss makes all the decisions and reaps all the rewards – he has set an example for other Taiwanese firms to follow, in much the same way that Bob Noyce and Intel did for the start-ups of Silicon Valley. "Stan has contributed much to Taiwan's PC industry," says Lance Wu, a former district manager at Bellcore who is currently deputy general director of Taiwan's Computer and Communication Research Laboratories. "He set the road model for many start-ups here."

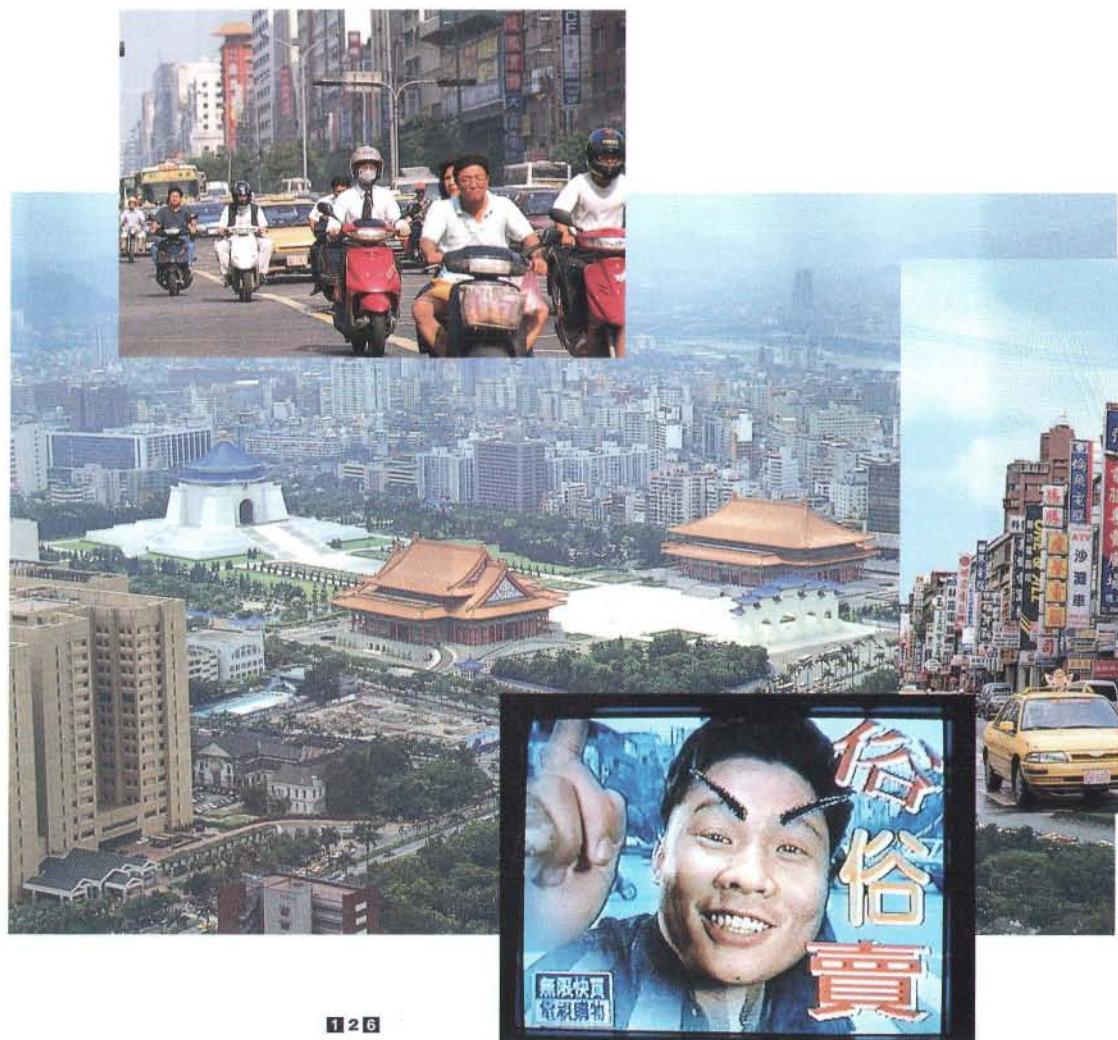
Stan Shih was born 50 years ago in the Taiwanese port city of Lukang, 110 miles south of Taipei. An only child, Stan was just 5 years old when his father died, so from his earliest years he had to help out with the family business. "I learned business in primary school, selling eggs," Stan recalls. Through this experience he learned how to convert weight to unit price. Even today, Stan reckons that he is swifter at mental math than most of his employees.

Eggs were not the Shih family's only stock in trade – they also dealt in stationery goods. So Stan acquired a second business model, and a

M.I.T. (Made in Taiwan)

The guts of the information age are manufactured in Taiwan. But if you think Taiwan is just another bunch of high-tech sweat shops, think again. Taiwan's Internet traffic is greater than Japan's. The brain drain of Taiwanese entrepreneurs, engineers, and scientists is reversing from Silicon Valley back to Taiwan. And Taiwan is now a functioning democracy.

By Andrew Leonard



sensitivity to shelf life that would serve him well later. "With eggs, the margin is 10 percent and inventory is good for two days," he explains, "so it's a low-margin, quick-turnover business. With stationery, the margin is 50 to 60 percent, and you keep inventory for three to six months." Stan says he often spends time explaining product cycle times and inventory risk to his subordinates.

In high school Stan was a good student, but it was not until he got to Taiwan's élite National Chiao Tung University that he really began to shine. He graduated with a BS in 1968, did a year's military service, then got his master's degree in 1971. Stan came in at the top of his class as an undergraduate, the school's first crop of graduates since it was transplanted from mainland China. At the university he was good at science and math, but he also spent a lot of time on social activities, starting teams for table tennis (Stan remains a demon with the ping-pong paddle) and volleyball, as well as a photography society and chess and bridge clubs. "I was captain of all the societies," he says, "and from that I learned how to deal with people."

As he developed leadership skills, Stan began to develop ambitions. Initially these were academic, but he says after he came in *second* in his graduate school class, "I lost my interest in study."

In 1971, the electronics industry in Taiwan was just beginning to take root. Multinationals like General Instrument and Philips were setting up on the island, attracted by the availability of cheap, well-educated labor. Graduates were paid \$200 a month, an unbelievably high salary for Taiwan in those days. At the same time, local home-appliance firms like Tatung and Sampo were licensing technology from the Japanese to produce electrical goods for the protected domestic market.

Stan's first job was with an outfit called Unitron Industrial Corp., one of the earliest Taiwanese companies to boast its own R&D section. There, among other things, he single-handedly developed the island's first desktop calculator. In 1972, Stan moved on to Qualitron Industrial Corp., a company dedicated to calculator production. Qualitron dispatched the 28-year-old engineer to Los Angeles (a 27-hour flight in those days, stopping in Manila and Hawaii en route) to buy microprocessors from Rockwell and to get trained in their application (everything from traffic-light controllers and medical instruments to pinball and slot machines). Stan understood that the microprocessor would be the core technology for a new industrial revolution.

Characteristically, upon his return to Taiwan, Stan set about spreading the word, giving lectures on microprocessors to enthusiastic young Taiwanese engineers. (Later, from 1976 to 1980, after Stan founded the company which would ultimately become known as Acer, he would train some 3,000 engineers in the fundamentals of microprocessor-based design, laying the foundation for the island's information technology industry. In the mid-'80s, Acer would make PCs available for hands-on training of hundreds of thousands of primary and junior high school kids. Such activities are of course not entirely altruistic: they also serve to create future customers for Acer.)

As an engineer, Stan's main claim to fame is that he designed the world's first pen watch. Not exactly a technical breakthrough, the pen watch was nonetheless a big hit commercially. And it taught Stan an important lesson: even a small innovation can create a lot of business.

Though successful, Qualitron ran into financial trouble. The company borrowed money to bail out a sister company that made textiles. But the textile industry was in a tailspin, and the sister company went

Parked by the hundreds on city sidewalks, endlessly roaring down alleyways and avenues, and ignoring, like the rest of Taiwan's traffic, even the most basic road regulations, Taiwan's 10 million motorcycles clog every opening on the island. Yet even in the congested capital of Taipei, traffic rarely stops. Perhaps it's the inherent flexibility of motorcycles, or maybe it's what one observer called the "efficient exception-handling subroutines" of Taiwanese drivers. There's a constant flow, an order within the chaos, symbolic of a societywide impatience with going slow and an ability to overcome any obstacle.

At any intersection, waiting for a light to change, one gets the sense of a nation schooled from the cradle in the art of shooting the gap. Drivers jockey for posi-

tion. A backlog of buses, trucks, and cars waits impatiently, immobile, but in its interstices a pack of cycles sneaks forward. There's the man hauling four propane tanks on a bamboo trestle above the rear wheel of his Honda, revving his throttle. There's the woman with a surgical mask over her mouth easing forward her red Yamaha, tapping her shoes on the sticky tar. When the crosslight turns yellow, the drivers accelerate in a mad frenzy, swerving around stragglers and rushing to the next light, where they do it all over again.

Taiwan didn't become the 14th-largest trading nation in the world by waiting for the light to turn green. To shoot the gaps in today's information age, the Taiwanese have latched onto the most crucial commodity of the modern era — computer components. Taiwanese companies sell more motherboards, monitors, mice, and scanners than any other nation's companies. Taiwan today makes 20 percent of the notebook computers in the world. Once a wellspring of cheap plastic toys and low-grade

To the uninitiated, the traffic can be terrifying: a nation of scofflaws driving at top speed. But there's no better place to see Taiwan's "over-abundant impetuosity" than in the smog-choked, neon-mad mayhem that is Taipei, the capital. Or you can watch it on TVSN, the first cable home shopping network in Asia.



Andrew Leonard (aleonard@well.sf.ca.us) is a freelance writer based in Berkeley, California. He specializes in cyber-Asia.

bankrupt, taking Qualitron – and Stan, its product vice president – down with it. The way Stan tells the story, he had no choice but to start his own company. In 1976, he founded Multitech International Corp., the precursor of Acer, with \$25,000. Stan and his wife Carolyn Yeh owned 50 percent of the firm, with four other co-founders sharing the remaining half.

Having your wife as a partner is not unusual in Taiwan, where most businesses are family-owned. ("Better to be the head of a chicken than the tail of an ox," runs an old and oft-quoted Chinese proverb.) The boss's wife often takes the role of tightfisted keeper of the corporate purse. Even big companies tend to be centrally controlled, with the smallest budget items requiring the boss's approval.

One such company is Acer's arch-rival, Mitac. This is run by Matthew Miau, the son of a local petrochemicals magnate. It is hard not to be impressed by Miau, who is unusually tall for a Chinese, wears immaculately tailored suits, speaks perfect English, and back in the '70s was a member of one of Intel's early design teams. By contrast, Stan, with his humble manner, his toothy grin, and his hard-to-understand accent doesn't come across nearly so strongly. But even back then, as Stan tells it, Acer was twice as big as Mitac. Today, he says, that gap has widened: Acer is five times bigger. But why?

Because Stan was smart enough to realize that, to grow beyond a certain size, he would need to recruit and keep a team of talented managers. This in turn would require delegating authority and distributing rewards. Starting from Acer's third year in business, Stan began inviting managers to become shareholders in the company. Each year more and more employees picked up stock options, so that by the time the company went public in 1988, the founders had dilut-

baseball mitts, Taiwan has turned to churning out silicon wafers and integrated circuits – the guts of the information age.

Two out of every five computers in the world have motherboards made in Taiwan. US chip designers can be made or broken by a Taiwanese manufacturer's decision to choose their products for inclusion on a circuit board. Taiwan is one of the few countries that can produce 16-Mbyte DRAM chips. The 1993 Computex computer show in Taipei drew 8,000 buyers from abroad along with 80,000 domestic visitors.

A mountainous island about the size of Connecticut and Massachusetts combined, Taiwan outmaneuvered much bigger nations on its way to the technological front by getting to the crosswalk with products just the slightest bit better, or cheaper, or faster, than everyone else. Displaying the same virtuoso flexibility with which they pilot their motorcycles, the Taiwanese have adapted to the zigzags of market capital-

ed their ownership from 100 percent to about 70 percent, and some 3,000 employees had a stake in the company.

"Stan's very generous about benefits and diluting stock for employees," says K.Y. Lee, president of Acer Peripherals Inc. "At Acer, we have a chance to purchase shares at a very low price."

Tolerance is another of Stan's virtues as a manager. "In meetings, people tend to get emotional, argue strongly," comments a second trusted lieutenant, Ronald Chwang, president of Acer America. "But Stan keeps his cool, never gets excited. He's able to control his emotions and to shift his view."

Such qualities have enabled Stan to retain the loyalty of his top managers. Lee has been with Acer 17 years, and the average for heads of the group's business units is 12 years. Chwang, who was with Intel, is a relative newcomer, having been with Acer just eight years.

Stan's record on delegation is also impeccable. "When Stan gives us a target," says Lee, "it's normally just an outline – the detailed stuff we work out for ourselves. We're very entrepreneurial; there's a lot of room for us to exercise our discretion."

The ability to delegate is particularly important, because Acer has no huge domestic market to depend on. Taiwan exports 97 percent the PCs it makes. By contrast, Japanese producers sell 85 percent of their production at home, according to Stan. "Since our markets are mostly overseas [56 percent North America and Europe, 44 percent Latin America, Pacific Rim, and Middle East], we have a much more decentralized structure than a US company, which would typically be dominated by its headquarters in the US," says Chwang.

Cracking the US market – which currently accounts for 30 percent of the company's sales – has not been easy for Acer. Stan's initial

ism. They possess neither the resources nor the power to set the course of the world market, but the Taiwanese have few peers at nimbly dodging around it.

Flexibility has been an essential Taiwanese survival characteristic for centuries. Eighty-five percent of the population descends from immigrants who fled the Chinese mainland two or three hundred years ago, driven by famine, war, and the promise of opportunities. After the Sino-Japanese war in 1895, China's ailing Qing dynasty ceded Taiwan to Japan for a 50-year period that ended with Japan's defeat in World War II. In 1949, after years of militant struggle between Chinese Nationalist and Communist forces, Generalissimo Chiang Kai-shek and more than a million of his soldiers and followers (the Kuomintang) escaped the Communists in China by fleeing to Taiwan. Joining up with a provincial government that two years before had suppressed a rebellion by the native Taiwanese, the Kuomintang



approach was to hire experienced outsiders, most notably Leonard Liu, a Chinese-American who was formerly general manager of IBM's software development laboratories in San Jose, California. In 1990, Liu arranged the acquisition of Altos Computer Systems, a small US maker of minicomputers, on the grounds that Altos had sizable resources in the US, which Acer would need to compete with US firms.

But the acquisition turned out to be a disaster, costing Acer more than \$100 million, including severance payments for former Altos employees. At the same time, the recruitment of Liu and others parachuted in from the outside created tensions within the company, especially as the confrontational style of the newcomers clashed with Acer's more consensus-driven approach. These incompatibilities were probably the main reason for Liu's early departure in April 1992. (Now chief operating officer at Cadence Design Systems, Liu declined to be interviewed for this article.)

The 1990s began badly for Acer in other ways, too. A bloody price war in the PC business cut margins. At the same time, the construction and equipping of TI-Acer became a black hole that sucked in cash. In 1991, Acer hit rock bottom, with losses of \$22.7 million. But for Stan, the worst moment came when, for the first time in its history, Acer had to lay people off. Or rather, ask them to resign ("in a Chinese company, we don't talk about layoffs," Stan explains). For Taiwanese long accustomed to hearing nothing but success stories about Acer, the layoffs were hard to understand. To his credit, Stan did not shirk responsibility for them. "He faced the public very bravely," says K.Y. Lee, "and explained why the layoffs were necessary."

At the same time, however, Stan was taking more positive steps to get Acer back on its feet. He realized that since going public in 1988,

Acer had lost that crucial motivating sense of ownership, of shared risk and reward. Stan's solution was to spin off many of the company's units as separate but wholly owned firms, and invite employees to purchase shares in the new enterprises. (Acer has also launched joint ventures with local assemblers and distributors, like Computec de Mexico, in which it maintains only a 50 percent share.)

Future plans call for 21 companies to be floated worldwide. In the second half of 1994, two subsidiaries, Acer Peripherals and Acer Sertek Inc., will likely be listed on the Taiwan stock market. In 1995, Computec de Mexico is to be listed on the Mexican stock market. Also in 1995 or early 1996, Acer hopes to list Acer America Corp. on the New York Stock Exchange. In 1996, Acer Computer International will list on the Singapore stock market.

Further out, it is possible that TI-Acer will be listed in Taiwan in 1997. Acer Labs is in the initial phases of being spun off. Approximately 25 percent of equity in Acer Laboratories Inc. is held by management and employees.

Stan communicates this new arrangement using a metaphor drawn from computer terminology. He calls it the client-server model, in which strategic business units (servers) like Acer Peripherals provide regional business units (clients) like Acer America with services such as technology and manufacturing. In this model, Stan's role is to be – what else? – the operating system for the group.

The difference is that an operating system is an indispensable part of the computer, whereas Stan says he does not see himself as an indispensable part of Acer's future. "I've worked very hard to make sure Acer won't need me," the 50-year-old told Singapore's *Business Times* last December. "Before I get too old I should retire." ■ ■ ■

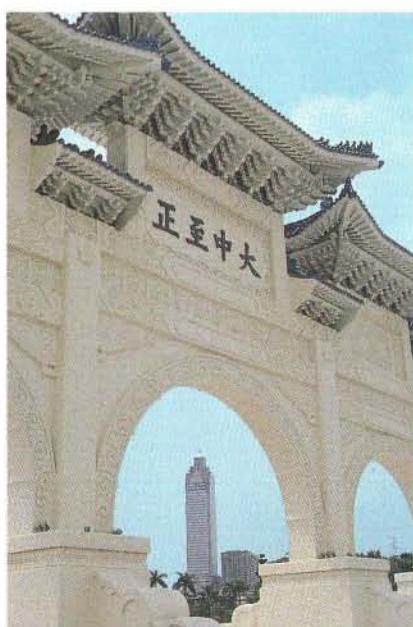
made the island their base for "retaking the mainland." The new leadership imposed a restrictive martial law regime, and Chiang's followers, referred to as "mainlanders," secured a monopoly over politics and the military that has begun to disintegrate only in the last decade, especially since martial law ended in 1987.

Still, the last 100 years of cultural and political turmoil haven't been sufficient to put a cap on what James Davidson, the United States Consul in Taiwan at the turn of the century, described as a national tendency toward "overabundant impetuosity." When Taiwanese society chances upon an opportunity to make money – or, for that matter, an opportunity just to have fun – it surges forward as one entity. All those decades of repression, argue some of Taiwan's social critics, have conditioned the Taiwanese to strike like lightning whenever they see an opening, and to swerve out of danger as soon as the gap closes.

Double E's: Home to Roost

Government encouragement of the "information industry" has played an enormous role in Taiwan's growth, but there's a grassroots techno-infatuation going on as well. One day in May, in a cavernous exposition hall at Taipei's domestic airport, thousands of twenty- and thirtysomethings mill among hundreds of booths, scanning information pamphlets and scrutinizing Chinese character-laden computer monitors while loudspeakers alternately blare Madonna and Taiwanese folk songs. Some visitors stop in front of a full-scale stage to watch a mock Taiwanese folk opera celebrating the virtues of a virus-killing application (Taiwan is an ace producer of both viruses and virus-protection systems). Across town, tucked beneath an overpass cutting through one of the city's busiest neighborhoods, is Taipei's KuangHua Market. Buddhist antique stores share space with tiny retail computer outlets. Incense wafts past young men and women hunched in concen- 156 ▶

Tommy Chen (left, top), has designed hardware and software for what he hopes is Taiwan's next national craze: home shopping. Lance Wu (left, bottom), deputy general director of Taiwan's Computer and Communication Research Labs, says more than 1,000 expatriates have returned to work in the government's Hsinchu park. At right is Taipei's Hsin Guang Skyscraper.



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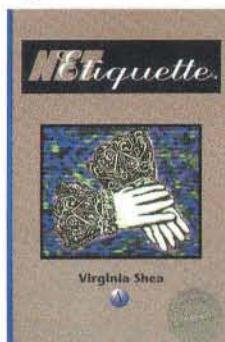
Exclusively from Metrowerks, the developers of CodeWarrior.

Cosmology of Kyoto

Mind Your Net.Manners

The Net right now is a little like New York in the late 19th century – waves of immigrants imposing themselves upon an established society. Not surprisingly, the newcomers don't always behave according to local custom, and members of the old society are sometimes suspicious and resentful," writes Virginia Shea in her book, *Netiquette*.

Shea's guide to network etiquette will be a valuable tool for the immigrant; perhaps, as Guy Kawasaki suggests in the foreword, a



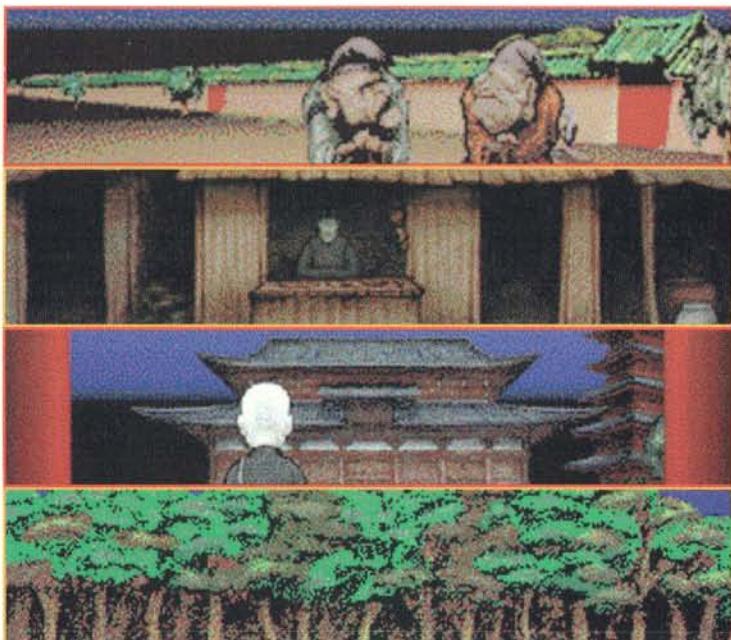
copy should be included with each modem. Longtime Net citizens will find little help, however. The thornier subtleties are not addressed, and some of the technical details are just a touch off.

All in all, *Netiquette* is handy to have around, especially to cite when needed. Gift-wrap a copy for your favorite newbie. Express Mail one to your favorite net.bozo. (Be watching for *Wired's* new *Netiquette* column, "Dear Diva" – hosted by Dame Raquel, Network Diva – coming in October.) – Amy Bruckman

Netiquette, by Virginia Shea, US\$19.95. Albion Books: +1 (415) 752 7660, info@albion.com.

The *Cosmology of Kyoto* CD-ROM comes with a bare minimum of instructions, informing me in a few words how to move within the images. No goal is established and no points are scored; the game never informs me what the object is, although it discreetly tracks the levels of karma and cash I have attained and keeps an inventory of my possessions. The disc comes packaged with a large fold-out map showing the streets and principal buildings of Kyoto – circa 900, when, as Heiankyo, it was the capital of Japan. I begin to wander the streets.

The richness is almost overwhelming; there is the sense that the resources of this game are limitless and that no two players would have the same experience. I have been exploring the ancient city in spare moments for two weeks now, and doubt that I have even begun to scratch the surface. This is the most beguiling computer game I have encountered, a seamless blend of information, adventure, humor, and imagination – the gruesome side-by-side with the divine.



Lose yourself in a phantasmagorical depiction of 10th-century Kyoto.

In this medieval Kyoto, people exist alongside ghosts, demons, and goblins. On my travels I have met – and interacted with – a dog eating entrails, long-winded old farts, tradespeople (who offered me medicines, dried fish, cloth, rice cakes, amulets, and a chance to lose money on a cock fight), a monk leading a prayer meeting, kids playing ball in the streets (one is beheaded by a passerby), a friendly guide dog, a maiden with an obscenely phallic tongue, and a gambler who taught me a dice game.

The graphics are hauntingly effective, using a wide-screen landscape format. The individual characters are drawn with vivid facial characteristics, a cross between the cartoons of medieval Japanese art and the exaggerations of modern Japanimation. The speaking voices are filled with personality, often taunting, teasing, or sexy. There is the sense, illusory but seductive, that one could wander this world indefinitely. This is a wonderful game. – Roger Ebert

Cosmology of Kyoto for Mac: US\$98. Azuma Lander International: +1 (415) 928 7914, fax +1 (415) 362 6879.





Newton's Home Run App

Technology & Media

For a digital communications junkie like myself, Denise Caruso's newsletter, *Technology & Media*, is a godsend. Caruso, who recently edited *Digital Media*, and her team of reporters and editors are not just up-to-speed on the latest developments related to communicating through technology, but more importantly, are able to provide much-needed critical analysis. This is one of the places to go if you want to understand the Big Picture.

The debut May issue kicked off with Caruso's own



"My Way or the Highway? Telco, Cable and Government Cross Wires." Her savvy and opinionated piece makes a rather complex subject (how cable and telephone companies are attempting to position themselves for the future) understandable, while ferreting out the key issues at play.

While the layout leaves much to the imagination, and the editorial mix signals a wide search for an audience (among those willing to fork over US\$595 for 12 issues), it looks as though Caruso has a winner on her hands.

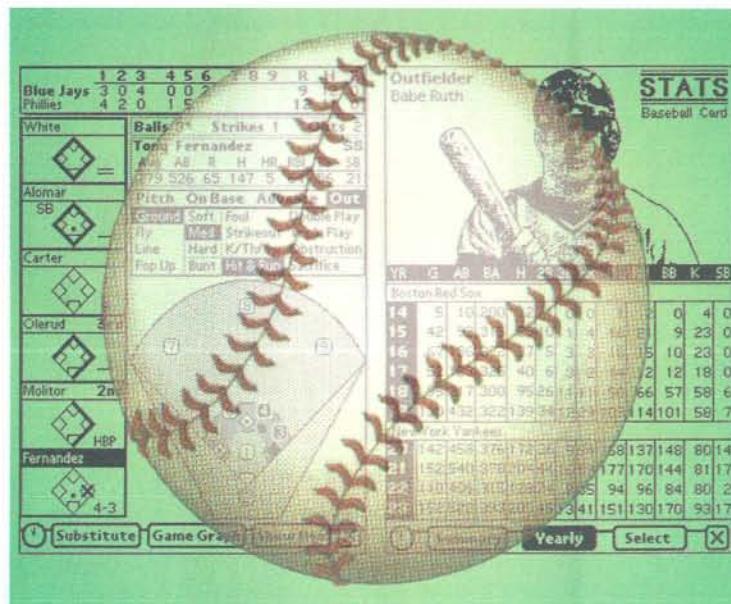
— Michael Goldberg

Technology & Media: (800) 978 5400, +1 (415) 546 5600.

If you're a baseball freak, and especially if you're a player in the virtual pastime called fantasy baseball, you now have a compelling reason to buy Apple's Newton: Fingertip for STATS.

It's actually several programs in one: An electronic scorecard that allows you to document a game dynamically, with instant access to a dizzying array of statistics. An electronic baseball pool where you can compete against fellow Fingertippers. And, best of all, a smart front-end to a dedicated dial-up service, run by the respected STATS organization, that gives you a daily major league baseball update. (There's also a component with a subset of the *Bill James Encyclopedia*, but the database is abridged to the point of uselessness.)

Scouts at any level will find the scoring component a wonder, and even a casual bleacher bum will find it the ultimate status accessory — though it's tricky to juggle a Newton, a hot dog, and a beer. But anyone who follows The Show intently will love the ability to link to the STATS database and chart a favorite real-life or fantasy team. A well-designed interface



Fingertip for Stats: Kind of like having the Rain Man in the palm of your hand.

(minimal handwriting recognition) makes it easy to select the players you want updated, and once you hook up the modem to call the service (most people can use a local number), everything is automated.

Still, hooking the thing up to a modem and phone line every time you want an update is a royal pain. With the Newton's 2400 baud modem rate, the updates seem to take forever. I want to go wireless! I want to be sitting on the deck — either the deck outside my house or the upper deck at Camden Yards — with the Newt in my pocket, and hear it beep so I can pick it up and find out that Albert Belle has popped a three-run dinger, or that the Rocket has tossed another shutout.

Nonetheless, at about two or three every morning, I make the effort to plug in the Newton to find out how my Random Hackers fantasy team has fared. And every week before our league does waivers, I get the skinny on the disabled list. My fellow fantasy baseball team-owners are burning with envy.

Finally, a killer app for the Newton! — Steven Levy

Fingertip for STATS: US\$99. Fingertip Technologies Inc.: (800) 349 4653, +1 (714) 759 9399.

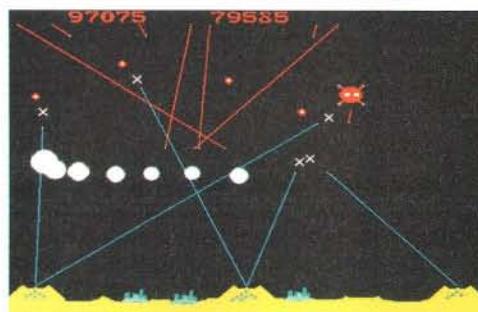
Retrocadia

Fifteen years after the arcade débüt of *Asteroids* comes *Microsoft Arcade*, a Windows collection of five of Atari's best-known arcade titles. Though these classic games have been translated by others over the years, *Microsoft Arcade* has done the best job of remaining true to the originals.

The feature attraction in the five-game bundle is *Asteroids*. It looks and plays like the real thing: white lines simulate the vector graphics of the original to a T, and the firing accuracy of that damned, small flying saucer remains on-target!

Missile Command is another clone right from the arcade. It's the first licensed rendition of the nuclear holocaust game to feature three antiballistic missile bases, just like the coin-op. The game play picks up speed awfully fast on a 486 or a Pentium, but things can be slowed down in any of the games by customizing options.

Battlezone and *Tempest*, likewise, look identical to their arcade counterparts. *Battlezone*, we quickly discover, was actually one of Atari's dullest games.



The arcade games you used to play instead of studying.

Blowing up enemy tanks repeatedly didn't make it appealing in arcade halls, being immersed in the game by looking through a periscope-like viewer did. *Battlezone* was virtual reality for a quarter, way before somebody invented the term and started charging people six bucks to play this type of videogame. *Tempest*'s malady is that any version of this game simply won't play well without the spinning knob used on the coin-op to whirl the yellow, crab-like shooter around the geometric play fields.

The real mutt of the litter is *Centipede*. Though this version depicts the mushroom-riddled play screen in its original, vertical aspect ratio, the graphics are tiny and really require a 21-inch-or-larger monitor.

Sure, it's more fun to play these games on the original coin-ops, but good luck finding 'em. If you insist on strict realism, go ahead and buy *Microsoft Arcade* — and send me a quarter each time you use it. — Howard Wen

Microsoft Arcade for Windows: US\$39.95. Microsoft: (800) 426 9400, +1 (206) 637 9308.

Shrinks in Love

DATman

Sony seems to have taken the phrase "good things come in small packages" to heart with the TCD-D7 DAT Walkman, a feature-packed, portable Digital Audio Tape recorder that fits in the palm of your hand. With CD-quality recording, audio position markers, and a recording time of more than two hours (four hours in LP mode), the DAT Walkman is an impressive piece of machinery. I originally bought it just to tape interviews, but I've used it for everything from mastering music to playing back sound cues in theatrical productions.

A handy feature is the limiting mode built into the TCD-D7 for music and speech, so that music levels don't distort and speech is more distinct. While you can't control the amount of limiting, the two settings are useful in most applications.

Before you run out and buy one for your very own, there are two pitfalls — courtesy of Sony — that you should be aware of. The first problem is accessories,



Before you buy a MiniDisc player, listen to this.

which are almost impossible to find. Sony customer service told me that I'd have to wait from six to eight weeks for an AC adapter. Considering that the unit doesn't work with rechargeable NiCad batteries and the four AA batteries only last about two hours, this is no small inconvenience. (After a bit of searching, I found a store that sells the adapters for US\$35 — The DAT Store, in Santa Monica, California: +1 (310) 828 6487.) The second problem is that the TCD-D7 uses SCMS (Serial Copy Management System), an irritating scheme preventing digital-to-digital recording.

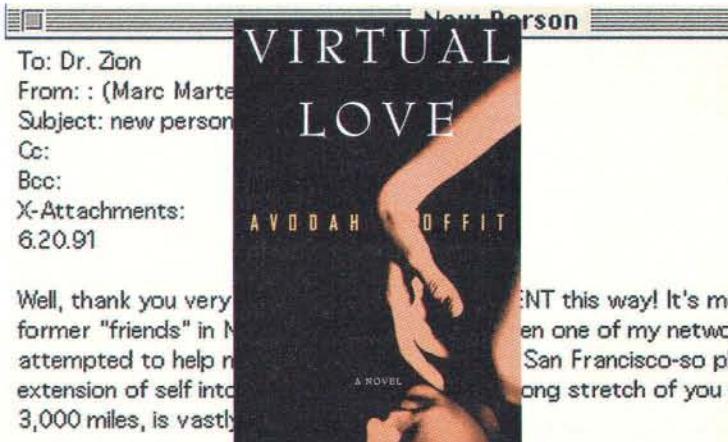
The US\$700 TCD-D7 is a handy little unit. While it won't replace professional DAT decks for mastering, it is far superior to both Philips's DCC (Digital Compact Cassette) and Sony's MiniDisc technology, both of which use lousy compression and therefore degrade the audio they record. — Erik Holsinger

TCD-D7 DAT Walkman: US\$700. Sony: +1 (201) 930 7669, fax +1 (201) 573 8608.

Virtual Love is presented in the form of an e-mail exchange between Aphra Zion, psychiatrist and sex therapist, and another screwed-up psychiatrist, Marc, who hasn't slept with his wife since she got pregnant (and their kid is now old enough to learn to read) and is in love with one of his patients, a beautiful Hegelian thinker who hasn't ever been able to let a man penetrate her. Marc thinks he has the ultimate cure, but his morals (and fear of being professionally ostracized) are holding him back.

For Aphra, online existence is far more inspiring than the humdrum reality of treating patients. Like the neurotic woman who gets so turned on after she kills her unfaithful lover that she then kills her rich husband. Or the middle-aged woman whose father called her Miss America and sexually abused her so that it was impossible for her to make love until an artist spent almost a year warming up her frozen inner core. The only thing Aphra likes better than listening to these confessions of sexual frustration is writing her own to Marc via e-mail.

Aphra initially tells Marc of some of her more bizarre patients, but then she retreats to her past, and in perceptive detail relates the traumatic



incidents in her wretched childhood, wretched former marriage, and wretched current marriage. In return, Marc e-mails her about his traumatic experiences — the death of his younger brother, abandonment by his mother — and the two online lovers realize they share a virtual past.

For a while, the doctors become so engrossed in their online relationship, it seems they prefer it to reality. Says Aphra: "What goes on in my mind has always seemed more real than life. Writing to you, communicating in this virtual way, has a stronger reality than any verbal exchange or relationship." Both characters use e-mail to express unactionable desires: Marc wants to screw his frigid patient; Aphra wants to have an affair with anyone else "as a rite of independent celebration." Both, of course, are on the verge of leaving their mates.

This book makes clear that Net-based behavior has always been the stuff of psychiatry. That's why it's a clever concept to use e-mail to mirror the thought processes and feelings of these two messed-up docs — it's all virtual, except for the reader who gets a vicarious thrill from getting inside these characters' heads. — Sylvia Paull

Virtual Love, by Avodah Offit, US\$22. Simon & Schuster: (800) 223 2348, +1 (515) 284 6751.

Video Saves the Radio Star

Imagine coming home and turning your radio on to clear music free of interruptions. Far-fetched? Not if you get Digital Music Express (DMX), a digital music service offered by more than 700 video cable companies. For about US\$10 a month and a one-time setup fee (\$10-\$15) your cable company will come out and install a small converter box with connectors that fit any standard receiver.

You also get a remote control with an LCD display screen. If you hear a song you



Kiss Rush & Howard by.

like from one of the 60 channels on DMX, push a button and the song's title, artist, composer, album, even a trivia question appear on the display.

DMX is blissfully free of the problems that plague regular radio — such as signals fading in and out, compressed dynamics, and limited bandwidth. The best thing about DMX? No commercials, and no screaming shock jocks. I haven't listened to regular radio since I got DMX nine months ago.

— John Starkovich

Digital Music Express: (800) 362 8863, +1 (310) 444 1744.



Salt of the Earth

Anatomy of a Cel

The gulf between casual 'toon potato and serious industry suit is bridged by *Animation Magazine*, which, now in its seventh volume, is as august as they come. As indicated in the scope of the magazine's departments, the field of animation has a hand in every business involving mass-market visual media: commercials, feature films, multimedia, and VR arcade attractions. But on another axis are the voices of the puppet-masters themselves, blending their own techtalk with personal views on the boundaries between imagination, technology, and



'Toons for our times.

narrative structure.

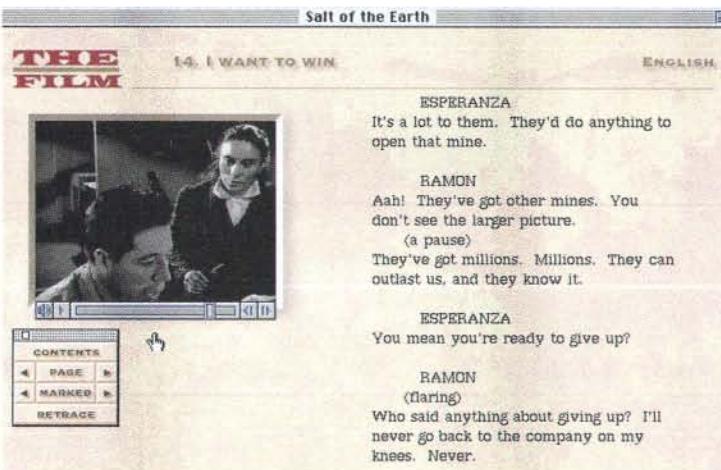
Animation refuses to be wowed by the current state of computer animation, sharing attention between the cel painter and the software designer. It also gives the reader a sense of the historical (one issue features an interview with godfathers of limited animation, William Hanna and Joseph Barbera). *Animation* damn near looks like the ultimate resource for the medium, and sophisticated as it is, you also get the cute baby animals. — Alan E. Rapp

Animation Magazine: US\$4.95. Thoren Publications: +1 (818) 991 2884, fax +1 (818) 991 3773.

What better subject for historical multimedia treatment than one with a multiple-media core to begin with? *Salt of the Earth*, a unique film made by blacklisted Hollywood leftists in 1954, offers a key work around which interactive producers Emily Kaufman and Aileen Stein have built a portrait of an era on CD-ROM.

Closely based on the real history of a 1950 strike at a zinc mine in New Mexico, the film's plot turns on a shift in traditional roles when the strike must be taken over by the miners' wives. Though hardly the most nuanced film ever made, it is an earnest and at times touching story of the struggle for racial, political, and sexual equality. The black-and-white film is included on this disc in its entirety, in a choice of two window sizes.

A wide range of ancillary material sets this work in the context of this country's worst period of political repression. The filmmakers braved incredible difficulties to make this movie, including the cruelly timed deportation of the Mexican lead actress, violent attempts at sabotage, and the refusal of professional services (themselves under pressure) to process the film. The soundtrack had to be recorded clandestinely in New



Salt of the Earth: The film that almost didn't make it to screen, now on CD-ROM.

York under the pretense that it was for a Mexican adventure story. It's hard to believe that a film espousing such homey values could once have been considered so radical. Today, *Salt of the Earth* is on the short list of films selected by the Library of Congress for the National Film Registry.

Included are excerpts from the work of director Herbert Biberman, interviews with screenwriter Michael Wilson and the other filmmakers, as well as their biographies, transcripts of their defiant appearances before the red-baiting House Un-American Activities Committee, photographs and histories of the real strikers (many of whom played themselves in the film), critical essays, and early reviews (including a vile, hysterically anti-communist screed by Pauline Kael).

Some will object to watching any film in a small, slightly jerky video window on a computer. The format works well for a work important for the window it provides on history rather than for its quite-good-under-the-circumstances cinematography. Improvements in digital video should eventually make a wider range of works appropriate for such illuminating treatment. — Jim Gasperini

Salt of the Earth for Mac: US\$49.95. Voyager: (800) 446 2001, +1 (212) 431 5199.

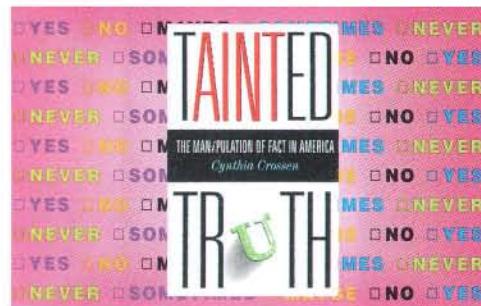
A Manual of Factual Self-Defense

As many as 70 percent of cola drinkers prefer ... is a refrain that usually loses our attention instantly. And well it should. The "As many as" means that research showed that any number from 0 percent to 70 percent showed the preference.

In *Tainted Truth: The Manipulation of Fact in America*, author Cynthia Crossen picks apart surveys, commercial research, government data, lawyers' misuse of statistics, polls of all kinds, and the manifold other ways that facts and figures can be made to stand on their hind legs and pretend they're smarter than they are. Many of the anecdotes are staggering examples of effrontery.

Is anything to be trusted? Crossen shows that the halls of academe have been polluted by commercial interests. The government has its own agendas. And everybody engages in doubletalk.

The book teems with juicy examples that will get



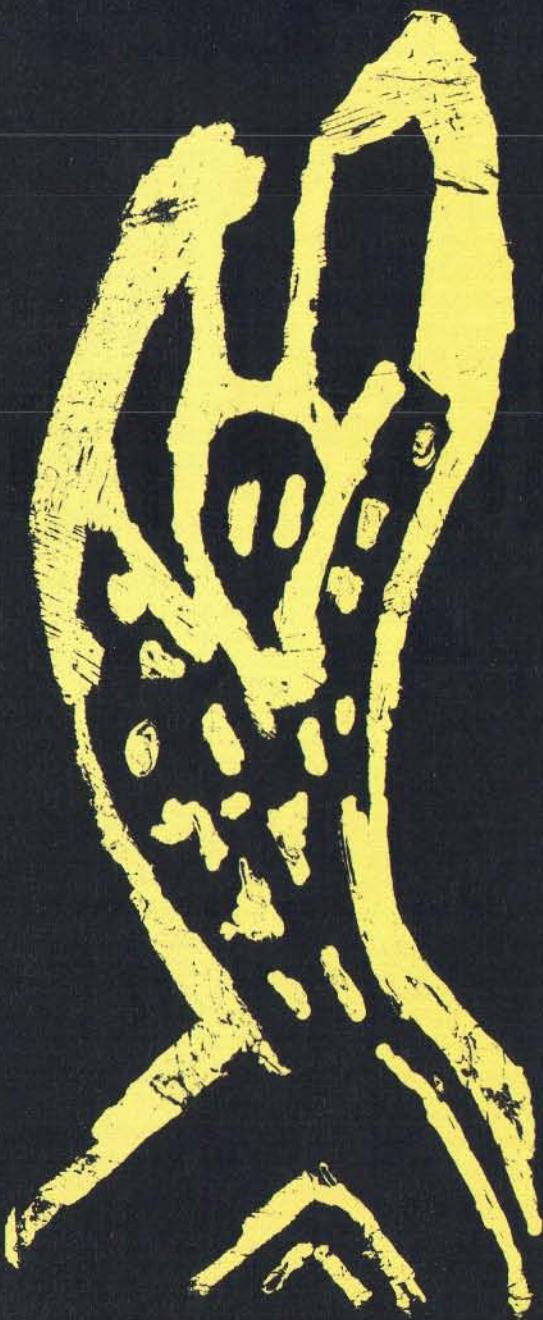
Tainted Truth: Learn how to lie just like the big boys and girls.

your dander up, but it also exhibits some of the glibness that it decries. In one glaring example, Crossen attacks a study supporting disposable goods by asking, "If it is so economical to use disposables, why have they not replaced glass, china, and stainless steel in every home in America?" conveniently ignoring important factors such as aesthetics and tradition.

I would have liked to have seen a less popularized analysis. The book ends with a set of ethical standards that would do much good if somehow implemented. But best of all would be to imbue people with the attitude Harry Truman expressed in a memo Crossen quotes: "I wonder how far Moses would have gone if he'd taken a poll in Egypt. What would Jesus Christ have preached if he'd taken a poll in Israel?... It isn't polls or public opinion of the moment that counts. It's right and wrong." — Jef Raskin

Tainted Truth: The Manipulation of Fact in America, by Cynthia Crossen, US\$23. Simon & Schuster: (800) 223 2348, +1 (515) 284 6751.

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Sonic Youth

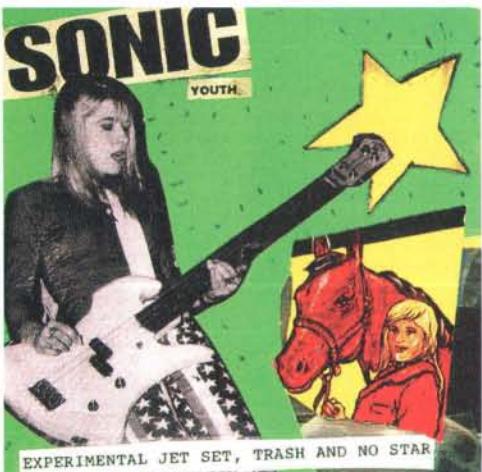
Experimental Jet Set, Trash and No Star

DGC

Access Code 1201

Ah, Youth: no one ever tagged 'em "easy listening." A college-radio favorite that sips from the major-label cup yet remains uncompromised, Sonic Youth creates alien, angular (albeit deconstructed, discordant, and self-absorbed) music – they must be flattered that hundreds of bands rip them off annually. Sonic Youth is 13 now, and *Experimental Jet Set*, lacking Goo's twisted accessibility or the coherence of *Daydream Nation*, is best described as the product of a surly teenager who is unpredictable, lovable, and clumsy.

Yet some things never change. Kim Gordon's voice still wraps around you like an old shirt; Steve Shelley's hyperactive drumbeats jar against the guitars of Thurston Moore and Lee Ranaldo; and a reper-



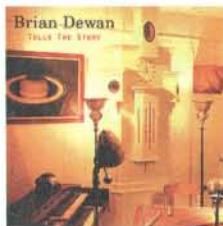
toire of obscure place references, literary characters, and odd rants about indie rock (namedropping SST, Superchunk, and Hüsker Dü) fill out the song list. "Winner's Blues," "Doctor's Orders," and "Tokyo Eye" are moody and mysterious, punctuated by whispery vocals and mellow guitar – nothing like the onslaught of "Starfield Road" and "Screaming Skull." On "Skink," Gordon takes a voyage "down to the bottom, and oh, what a bottom it is." From that vantage point you'll find the Youth trying to fathom their souls' depth, taking soundings on just where a dozen years at the head of the pack have left them. The answer comes, perhaps, in tracks like "Self-Obsessed and Sexxee," a lascivious, *Star 80*-esque story of obsession; and "Bull in the Heather," which places in close proximity innocence and danger – things a rock band should know plenty about.

A sketchbook that feels mostly incomplete, *Experimental* is no *London Calling*, but it's no *Combat Rock*, either; like so much about Sonic Youth, it's elusive, hard to define. I'd prefer to excuse the band's current distractedness as a gawky adolescent's coming to terms with the world. Sit back and anticipate a growth spurt. – *Colin Berry* ■

Brian Dewan

Tells The Story
Bar/None Records
Access Code 1202

This is folk music for the deranged. Dewan's instrument: a homemade electric zither. His subject matter: peculiar tales, such as "The Cowboy Outlaw" (the post-mortem, er, life of a hanged outlaw's corpse), "Wastepaper-Basket Fire" (one guess), and "The Record" (obsession with a new record). Dewan's zither can howl like an overdriven Les Paul or sing like a harp in a recital hall. His baritone voice can be chilling or uplifting. His brilliance lies in his ability to fascinate the listener, despite the horror. – *Peter Herb*



Various Artists

One A.D.
Waveform
Access Code 1206

Ambient music in the '90s has finally shed all the New Age, mind-numbing connotations that have plagued its development. *One A.D.* is a stellar example of the new school of low-key sonics. Here, Waveform, the US counterpart to England's Beyond Records, has distilled three volumes of genre-defining compilations. Featured electronic music pioneers combine the stark otherworldly beauty of dub reggae with luxurious digital soundscapes. The resulting tracks are a solid testament to this music's considerable depth and power. – *Scott Taves* ■

Erasure

I Say, I Say, I Say
Mute/Elektra Records
Access Code 1203

Like the soundtrack to a fairy tale, this lush sonic landscape is underscored by Vince Clarke's analog throb and brims with Andy Bell's gorgeous voice. While Bell soars from deep-down soul to uplifting pop balladry, straightman Clarke perfects his inimitable mix of infectious melody, spirited rhythm, and electronic wizardry. Add to their chemistry of opposites the angelic voices of a church choir, and the fantasy is complete. Erasure's lively, eloquent musical adventure bubbles with rich and beautiful songwriting. Plonk! Bleep. Sigh. – *Stephen Reese* ■



Spike Jones

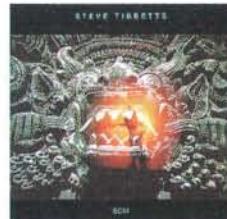
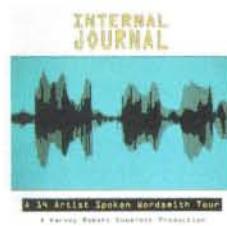
Musical Depreciation Revue: The Spike Jones Anthology
Rhino Records
Access Code 1207

Quintessentially inspired silliness. This two-disc collection of 40 of Spike's hits from the '40s and '50s includes original compositions and mad versions of pop songs and classical music, all in tight arrangements for a jazz combo and a huge battery of percussion (read: washboards, car horns, whistles, whips, a starter's pistol, even a toilet seat strung with guitar strings). "Vocals" also means gargling and hiccups. Digitally remastered from original 78 lacquers, the recorded sound is superb. – *Bryan Higgins* ■

Various Artists

Internal Journal
New Alliance
Access Code 1204

A companion piece to *LA Journal*, a photo essay about Los Angeles presented on laserdisc, *Internal Journal* collects the poetry of such writers as Wanda Coleman, Pleasant Gehman, and Marisela Norte. Unfortunately, these pieces aren't among the poets' best, and each poem appears both as an individual track and as part of an amalgam of the same recordings offered in quick succession. Regardless, this spoken-word disc presents the personality of the City of Angels from an insider's view. – *Paul Semel* ■



Steve Tibbets

The Fall of Us All
ECM
Access Code 1208

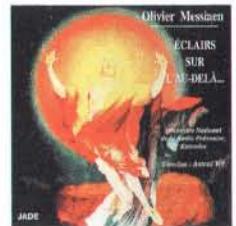
If you lived in Saint Paul, Minnesota, would you go all the way to Bali and Nepal for enlightened excitement? Yes, if you're Steve Tibbets. The guitarist and composer is a frequent-flyer of the pan-Pacific type, and his habit exerts more than a mild influence on his reverb-soaked Eastern trance-feedback playing. It's also echoed by percussionist Marc Anderson, who grounds Tibbets's Himalayan string-bending flights with his own banshee beats on exotic hand-drums and percussion instruments. Definite road-trip disc. – *Will Kretz* ■

Olivier Messiaen

Éclairs sur l'Au-Delà...
Polish Radio National Symphony Orchestra; Antoni Wit, Conductor
Jade Records

Access Code 1205

Olivier Messiaen was one of this century's most original composers. His final work, whose title means "Illuminations of the Beyond...," is an immense contemplation of death and the afterlife, scored for an orchestra of 128 instruments. The music, alternately hair-raising and ethereal, is ultimately blissful. As in many of his pieces, Messiaen, an ornithologist, makes ample use of bird song, "the bird being a symbol of joy and jubilation." – *Bryan Higgins* ■



Hieronymus Firebrain

Here and There
Magnetic
Access Code 1209

Multi-instrumentalist and original Camper Van Beethoven violinist Jonathan Segel introduces his four-year musical project. *Here* reflects influences from Richard Thompson to Fred Frith, though it's somewhat stifling in that prog rock kinda way. A retreat to Questa, New Mexico, and collaboration with psychedelic-in-the-'80s comrades The Whitefronts makes *There* more compelling than its predecessor, however. Optimizing his grass-roots indoctrination to indie rock, Segel plays by his own rules. – *Kristy O'Rell* ■

Microwave O' The Month



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Earache/Columbia Records

Slip into the tranquility of such, er, "songs" as "Twist the Knife (Slowly)" and "Retching on the Dirt," and experience the fetid blur that can only be achieved by imbibing toxic quantities of JD and contemplating suicide: then, wrecked and whacked, you decide to cut a record in your garage. *I'd rather die than listen to five more minutes of this little tantrum.* —Kristin Spence

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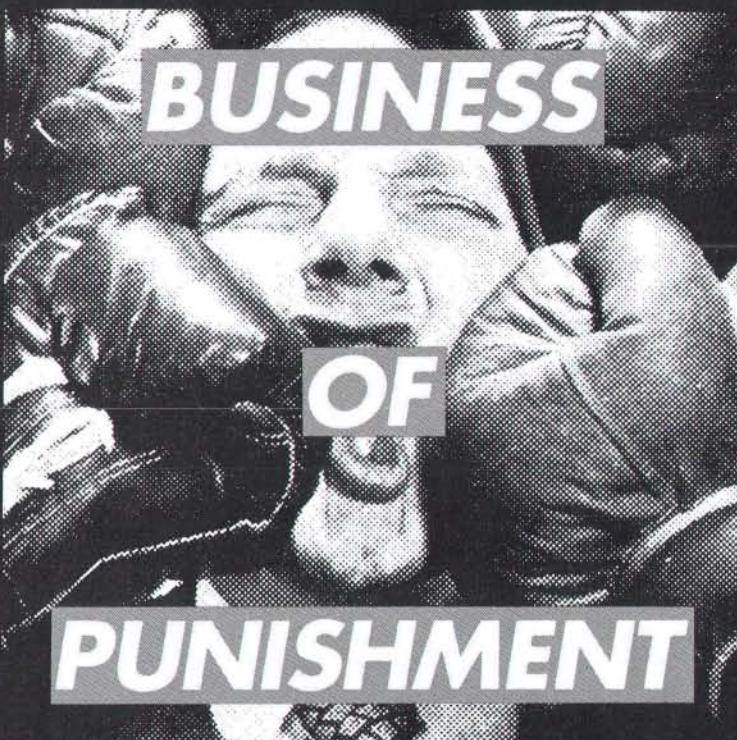
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Code Artist and Title

- 1201 Sonic Youth, *Experimental Jet Set, Trash and No Star*
- 1202 Brian Dewan, *Tells The Story*
- 1203 Erasure, *I Say, I Say, I Say*
- 1204 Various Artists, *Internal Journal*
- 1205 Oliver Messiaen, *Éclairs sur l'Au-Delà*
- 1206 Various Artists, *One A.D.*
- 1207 Spike Jones, *Musical Depreciation Revue*
- 1208 Steve Tibbetts, *The Fall of Us All*
- 1209 Hieronymus Firebrain, *Here and There*

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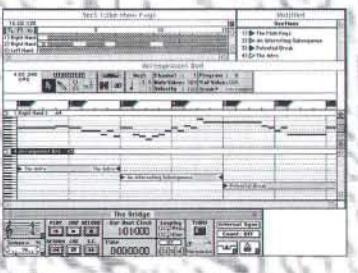
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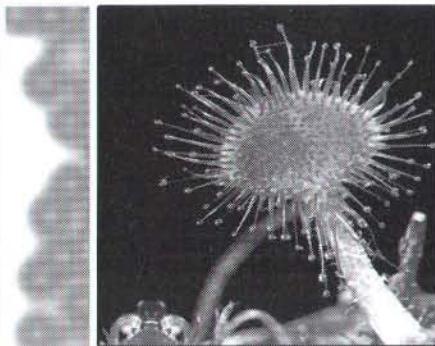
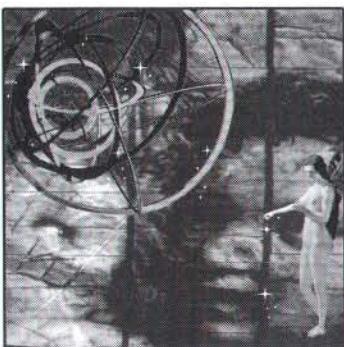


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What to Wear for Your Wedding

Weddings in the US involve big business and – ask any bridesmaid – considerable strain and weirdness as well. But, not to worry: wedding-planning software has arrived for that white-satin-and-tulle-lined market niche.

Bridesmaid for Windows has a simple-to-customize database capable of tracking events right down to place cards for a formal wedding dinner. It includes a spreadsheet for tracking expenditures and sufficient word-processing capability to keep extensive notes of conversations with vendors. Take it from a me, a lifetime maid of honor-cum-wedding planner,



Nuptials by numbers.

this is handy stuff.

While it won't alleviate the angst of planning a wedding, it will create order out of the chaotic preparations you punch in. It assumes – in my experience, correctly – that the user has access to other sources for advice. The least expensive of several wedding planning programs I've looked at, it is also blessedly free of preprogrammed checklist idiocies such as "Enjoy your wedding!"

I'm giving Bridesmaid to the next married-person-to-be who calls in a tizzy.

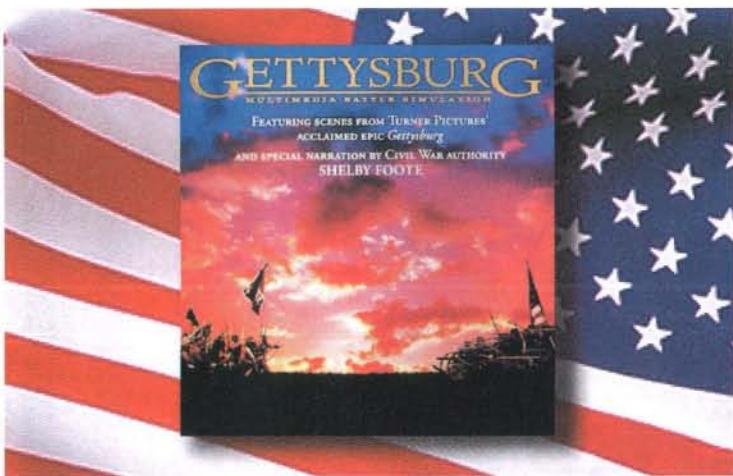
– Elizabeth Hughes

Bridesmaid for Windows: US\$19.95. Simply Software: (800) 425 1122, +1 (205) 870 1975.

Civil War What If

Not just another computer war game, *Gettysburg Multimedia Battle Simulation* is a well produced, interactive history lesson on CD-ROM, in which you give the marching orders to General Robert E. Lee's fearsome Army of Northern Virginia or the Union's Army of the Potomac. The condition and strength of the troops at the beginning of the battle are historically accurate. *Gettysburg* teaches the strategy of 19th-century warfare and shows how hard-fought the Battle of Gettysburg was – how it could have gone either way. Narrated by Civil War historian Shelby Foote, the disc contains several minidocumentaries on a variety of Civil War subjects. Foote's rich, Mississippian's voice provides continuous battlefield commentary.

The simulation contains a timeline and detailed maps of the Gettysburg battlefield, so you always know exactly when and where you are. Choose a



Gettysburg Battle Simulation: You call the shots on who takes the hits.

friend or the computer as your opponent, and fight for the Blue or the Gray. You can command separate brigades or whole divisions. Click on the binoculars icon, and scenes from Ted Turner's film *Gettysburg* appear to illustrate what's going on in the battle. Infantry, cavalry, and artillery units are all represented. They can be individually directed as they advance, retreat, and entrench themselves in defensive positions. *Gettysburg* lets you reenact the battle just as it happened, or modify certain elements to see if you can change history. I discovered that with a more effective artillery barrage on the final day of the battle, General George Pickett's fateful charge on Cemetery Ridge might have been successful. If you have a passion for American history, this disc is worth including in your multimedia library. – Steve Baxter

Gettysburg Multimedia Battle Simulation for Windows: US\$69.95. Turner Interactive: +1 (404) 885 7972, fax +1 (404) 885 6997.

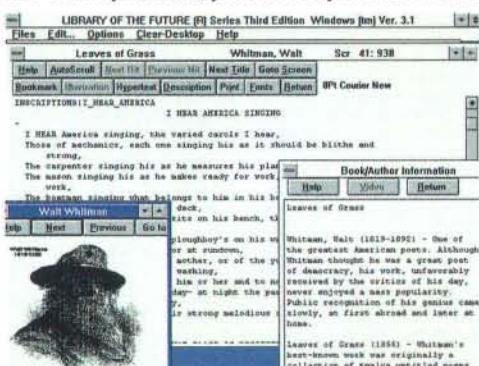
The Paste-Bomb Machine

Library of the Future sounds very cool, at first. It's a CD-ROM chock-full of Literature: the Bible, the Koran, Confucius, Euripides, Tacitus, Chaucer, Spenser, Blake – it's all terribly high-minded. Well, not all: there's also Conan Doyle, Bulwer-Lytton, H. Rider Haggard, and, oddly, K. Eric Drexler's manifesto about technology, *Engines of Creation*. It's plain ASCII text with a nifty search engine, exactly the kind of thing that the inventors of CD-ROM were thinking of when they filed the patent.

It lets you down, though, and I think the word "library" has a lot to do with it. A library contains books that one might read. If you think you're going to read *Billy Budd* on a VGA monitor, in a monospace font, you're kidding yourself.

So if you're not going to use this library for reading, what can you use it for?

1) Reference. Now when you wake up at two in the morning and can't get the phrase "tender mercies" out of your head, you'll have a place to turn. St.



Library of the Future is neither, but it still has its uses.

Augustine heads the list of hits, but the phrase shows up in the *Book of Mormon*, which you can get to with just a click or two of the mouse. (True, then it's two in the morning and you're reading the *Book of Mormon*, but that's a hazard of research.)

2) One-upsman ship. Nothing intimidates like quoting from Milton and Joyce, and with the *Library of the Future* you've got them at your fingertips.

3) Test data. Want to shake down your implementation of a Markoff sieve? A 20K block of the Brothers Grimm is just the thing.

4) Paste bombs. When some clueless blowhard blathers away about the Second Amendment in your favorite newsgroup, revenge is at hand. Slurp the Melian dialogue up into your clipboard and let him have it.

It's like any other good tool: useless, unless you know what to do with it. – Bob Rossney

Library of the Future, Third Edition: US\$149.95. World Library Inc.: (800) 443 0238, +1 (714) 756 9500, fax +1 (714) 756 9511.

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Net backlash (now: 1, was: 2, months: 2)

It was bound to happen: too many businesses joined the Internet for no reason other than fear of looking technologically backward, and now all they have to show for it is a loss in productivity as employees spend hours reading alt.sex.stories, playing MUDs, and searching for mythical net.treasures. Internet domains were snapped up like Florida swampland — sight unseen and out of fear of missing the "opportunity of a lifetime." While a mass exodus won't occur, a reexamination of the Net and its uses is sure to.

Commercial parallel processing (now: 2, was: 3, months: 2)

The parallel processing community (and supercomputing in general) has always imagined itself unsullied by market forces in its devotion to the frontiers of science. Two factors are changing this: government funds — long the lifeblood of supercomputers — are drying up, and corporations are discovering that they need more horsepower for their growing databases. While not glamorous, database servers are crucial for keeping track of everything from airline reservations to credit card bills; as these databases push the terabyte mark, conventional servers are becoming painfully slow. Supercomputer manufacturers are now grudgingly entering the field — and the real world.

	Current Position	Position Last Month	Months on List
Net backlash	1	2	2
Commercial parallel processing	2	3	2
Cracker wars	3	—	—
PCI bus	4	—	—
DSP	5	—	—



Cracker wars (now: 3, was: -, months: -)

Wherever crackers hang out, from IRC to MindVox, conversation has turned from the intricacies of LMOS to flame wars about the older generation of crackers (now in their 20s). The old guard — the Legion of Doom and Masters of Deception — is accused of living off its reputation and of being afraid to hack. The computer underground has always been a meritocracy: it's time for the new generation of crackers to stop arguing and start pulling off some Herculean hacks.

Peripheral Component Interconnect bus (now: 4, was: -, months: -)

It has become popular to characterize Intel as behind the technology curve, but this ignores the PCI bus, which is rapidly becoming a standard. The specifications are flexible enough to support the high speeds necessary for multimedia applications and are processor-independent. Even Apple's next generation of computers will use PCI rather than the NuBus standard, leading some pundits to predict a future of interchangeable (and therefore cheap) peripherals. Don't believe it.

Digital Signal Processors (now: 5, was: -, months: -)

DSPs are well suited for applications requiring video compression and advanced sound. The price of DSPs is finally low enough that they are being included in many new PCs, and vendors are trying to convince us that this is revolutionary. It isn't. NeXT included DSPs in its computers from the start, and it wasn't enough to save the company. The real revolution will come in a few more years, when DSPs are cheap enough to be used in consumer electronics, allowing for a whole new class of interactive pocket devices.

— Steve G. Steinberg

(What's got your hype-detector flashing? Send your vote to hype-list@wired.com.)

See Hear

Computers are already set up to handle the visual side of multimedia, but handling the sound is something else again. Like, where do you put the speakers?

Combining its strengths as a maker of good audio gear and great video monitors, Proton has put them — and an amplifier — into its 15-inch SVGA computer monitor. The 3-inch speakers fire out the sides. Aiming away from your ears means they lose some high-frequency response, but that just helps the sonic balance: small speakers like these don't have much bass anyway. The bass is actually a bit better than expected from small speakers. Plugging good headphones into the front-panel jack shows that



Look who's talking.

the Proton's built-in stereo amp, delivering only two watts per channel, can go down as low as most good headphones.

The video side has limitations, but not serious ones. The 15-inch picture isn't much larger than a 14-inch screen and the edges of the picture taper in a bit. Colors in VGA (16-color) mode are less saturated than with my old 14-inch monitor, but in 256-color mode they deepen up again.

You can buy a better monitor, a better amp, and a better pair of speakers, but the reasonably priced Proton yields good quality and an uncluttered desktop.

— Ivan Berger

PM1561: US\$799. Proton: +1 (310) 404 2222, fax +1 (310) 404 2322.

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Reconfiguring the Corporation

The Prince of Persia 2

So, you finally finished *Prince of Persia*. Your fingers hurt from the awkward keyboard controls, and your head is swimming from staring into your Macintosh magic mirror, but the Princess is at last within your reach. Not so fast—here comes Bröderbund's sequel, *Prince of Persia 2: The Shadow and the Flame*. As before, the traps, mazes, and riddles will have you ignoring the rest of your life until you complete the game.

Part arcade battle, part



Slo-mo swashbuckling.

puzzle-solving mystery, this is one of the most complicated computer games on the market. Though the plot is thin, it's all the motivation you need to start playing. After that, the complex puzzles hook you in for the duration.

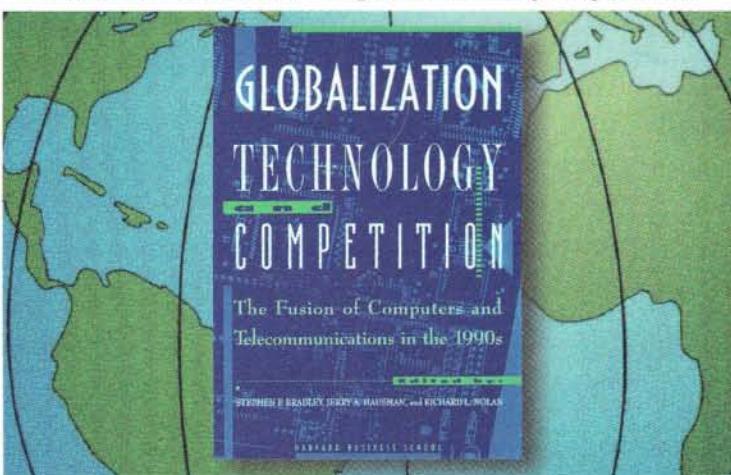
Production values are superb, but you pay for this beauty in CPU cycles: game play is slow, like knitting. Sure, there's swashbuckling—but the trade-off between keyboard responsiveness and detailed animation has been settled in favor of aesthetics.

—J. Caleb Donaldson

Prince of Persia 2 for DOS and Mac: US\$40. Bröderbund: +1 (415) 382 4600.

We all know that global computer networks will revolutionize a wide variety of industries. But which industries will change, and how? *Globalization, Technology, and Competition: The Fusion of Computers and Telecommunications in the 1990s* is a good introduction to the thinking of business professors on this subject. Its 15 articles, most of them grounded in case studies, provide simple but powerful concepts for understanding these issues. For example:

- The theory of transaction costs predicts which activities a company will conduct for itself, and which ones it will "outsource"—a matter of real concern if you're doing something that your employer doesn't regard as a "core competency."
- One formerly obscure travel agency understood that it could use global computer networking to assemble a "virtual company"—a global alliance of travel agencies that can rapidly reconfigure itself to serve increasingly globalized corporate customers.
- The retail sales business is being revolutionized by companies like



Do you really want to be competing in real time with every person on the planet?

Wal-Mart that can use computers and networking to track their inventory in real time and respond rapidly to demand. Products keep moving, prices keep adjusting, and suppliers are kept on their toes.

► Manufacturing is increasingly global as well. We've all heard about the car whose parts are made in half a dozen different countries and assembled in a few more, with materials constantly flowing wherever they're needed—another process that takes heavy networking.

So the phenomena are complicated and the concepts are powerful. The scary thing is that the authors of the articles in this book seem to talk only to managers. Their language is a synthesis of technocracy and hype in which the present and future tenses merge into one. Of course it's great when companies can provide me with the stuff I need right away. But do you really want to be competing in real time with every person on the planet? It's a difficult question even to think about in the stratospheric ozone of managerial talk. But let's read the book, and then ask it down here on earth. —Phil Agre

Globalization, Technology, and Competition: The Fusion of Computers and Telecommunications in the 1990s, edited by Stephen P. Bradley, Jerry A. Hausman, and Richard L. Nolan, US\$34.95. Harvard Business School Press: (800) 545 7685, +1 (617) 495 6192.





Babes in TuneLand

Scare Tactics

Every Friday evening on Fox television, FBI agents Fox Mulder and Dana Scully face truths we'd all like to avoid — pyrokinetic killers, ghosts, Native American werewolves, and UFOs, for example. We'd like to avoid them, but some idiotic urge keeps us coming back for more.

The X-Files delivers serious chills. In one episode, people keep turning up dead, missing their livers. Mulder and Scully track down the killer, a seemingly immortal mutant with a Hannibal Lecter appetite and the ability to squeeze through tiny open-



Agents of the unknown.

ings. In another, two men are killed at the same time, on opposite coasts, their blood drained from punctures in the neck. Their preteen daughters turn out to be clones of a fertility clinic researcher, herself part of a crèche of psychotic clones created during the Cold War. (And the daughters are none too friendly, either.)

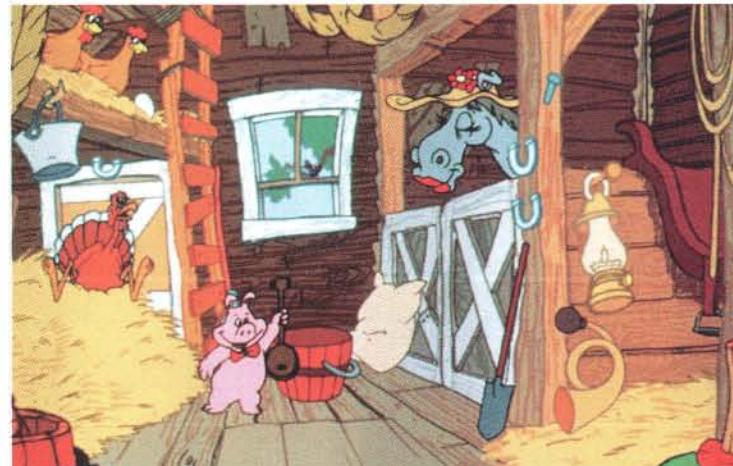
Special effects are low-key on *The X-Files*. But that's OK, since the real terror comes across with hardly any blood or gore; the show's pacing and storylines are what make me keep the lights on when I watch. — Adam Rogers

The X-Files, on Fox, Fridays at 9 p.m. EST and PST.

The first thing that will strike you after installing *TuneLand* from 7th Level is the total absence of any death-dealing instruments or fearsome opponents to use them against. The next thing you'll notice is that there's always something going on in this interactive songbook. Taking close aim at one of the major criticisms of CD-ROM-based titles — that there is too much dead air — 7th Level engineers have developed effective techniques to ensure that something is always happening while you're waiting for the laser to cue to the next song.

And there is a lot going on: everything in *TuneLand* is active, and clicking anywhere yields some sort of response — and not always the same one. The title includes over 12,000 frames of very attractive animation rendered using digital inking and painting tools developed by MetroCel Animation for such tube cult staples as *Beavis & Butt-head* and *The Ren & Stimpy Show*. Also featured are more than 40 favorite childhood songs sure to delight any young child and to drive parents batty after the hundredth playing — today.

It pays to have awesome speakers to listen to the *TuneLand* ditties, as they are full-blown CD-quality audio. Bet you never thought you'd hear



TuneLand: This time, Pink Floyd's barnyard animals stay on the ground.

the likes of former Pink Floydsters Scott Page (who also grabbed a producer credit) and David Gilmour exercising their chops on tunes like "The Old Gray Mare," "Eentsy Weentsy Spider," and "Three Blind Mice." Your guide to *TuneLand's* "DeskTop PlayGround" is comedian Howie Mandel as the voice of Lil' Howie.

The major disappointment in my travels in *TuneLand* was the quality of some of the incidental audio. These digitized bits jarred my ear after the exceptional production values of the principal songs, and made some of the dialog unintelligible. I also found disconcerting the presence of characters that seemed to be taken straight from the cels of *Fantasia* and other Disney classics.

My favorite touch? The *TuneLand* package includes a very cool sing-along activity book with the heretofore forgotten lyrics of many of my favorite childhood songs plus cutouts of *TuneLand* characters that I — uh — kids can color in and play with. If you're looking to spend some quality time with a child snuggled up in front of a computer, *TuneLand* deserves a CD-ROM caddy of its very own.

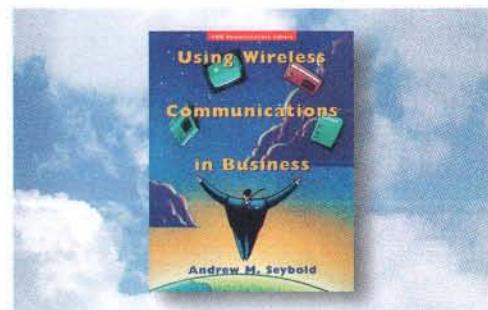
Looking for something more adult? Stay tuned for 7th Level's next project: *The CD-ROM Thingie*, starring Monty Python. — Clay Gordon

TuneLand for Windows: US\$49.95. 7th Level Inc.: +1 (818) 547 1955.

Using Wireless Communications in Business

You bought your pager and it was good. Then you got a cellular phone and it was better. Now you hear acronyms like SMR and PCS, companies like RAM and ARDIS, and buzzwords galore. What do you do?

Grab a copy of *Using Wireless Communications in Business* by Andrew M. Seybold. An engineer by training, Seybold skips the consultant-speak and provides helpful advice to individuals and companies looking to go wireless. He discusses the differences between local- and wide-area networks, what hardware and software are necessary, what's avail-



Transmit your message.

able and what's coming Real Soon Now. Seybold, a wireless road warrior himself, says wireless is not just another transport, it's a way of life.

The last two chapters, "Recapping the Services" and "A Guide to Implementation," are worth the price of the book by themselves. And although *Using Wireless Communications in Business* was written for nontechnical types, an overly complete glossary (it even defines "proprietary" and "mailbox") helps to guide you through.

Now what's needed is a book to explain how to carry all of this stuff. — Andrew Anker

Using Wireless Communications in Business, by Andrew M. Seybold, US\$34.95. Van Nostrand Reinhold: (800) 544 0550, +1 (212) 254 3232.

Street Cred Contributors

Phil Agre (pagre@ucsd.edu) teaches in the Department of Communication at the University of California, San Diego. His book, whose working title is *Computation and Human Experience*, will be published by Cambridge University Press.

Steve Baxter (baxcam@aol.com) is a Seattle-based CBS video journalist and CNN software reviewer.

Ivan Berger has been writing about audio and other aspects of electronics since 1962. He's currently technical editor of *Audio Magazine*.

Colin Berry writes about music and other things for *Ray Gun*, *Puncture*, *boING boING*, and *SF Weekly*. He's probably waited on you in some San Francisco restaurant.

Amy Bruckman (asb@purple-crayon.media.mit.edu) is a graduate student at the Media Lab at MIT, where she does research on virtual communities and education. She is the founder of Medi-aMOO and MOOSE Crossing.

Roger Ebert's film reviews appear in the *Microsoft Cinemania* CD-ROM, which recently added a Mac version.

Jim Gasperini (jimg@well.sfc.ca.us) is currently designing multimedia titles for several platforms in Paris and New York.

Michael Goldberg (insider@netcom.com) is a frequent contributor to *Wired*; he interviewed Strauss Zelnick in issue 2.06.

Clay Gordon is an 11-year veteran of the computer graphics industry. At the moment he is working on ways to make information safe from computers.

Peter L. Herb (ptherb@aol.com) is an attorney in New York City who plays guitar and can be found most weekdays wearing a bow tie and suspenders.

Bryan Higgins (bryan@well.com) plays the French horn and clavichord, writes fiction and software, and lives in Berkeley and Soda Springs, California.

Erik Holsinger is an independent producer, composer, and author of the *MacWEEK Guide to Desktop Video and How Multimedia Works* (Ziff Davis Press).

Elizabeth Hughes lives in San Francisco; that is, when she's not traveling in Asia and writing about the Pacific Rim.

Steven Levy writes the "Iconoclast" column for *Macworld* magazine and is the author of numerous books. He wrote "Bill and Andy's Excellent Adventure" for *Wired* 2.04.

Sylvia Pauli (fax +1 (510) 524 7975) is an agent provocateur, co-host of Cybersalon West, and an always willing co-conspirator.

Alan Rapp is the guy you think you've met before that you actually haven't.

Jef Raskin (raskinjef@aol.com) is the originator of the Macintosh computer and plays the Contrabass recorder in F, which stands over 7 feet tall.

Stephen Reese (jangle@tvo.org) works as a freelance writer, electronic musician, graphic artist, filmmaker, and computer software designer.

Adam Rogers (rogers@acs.bu.edu) is a science writer in New York. He doesn't watch nearly enough television.

Bob Rossney writes the Online column for the *San Francisco Chronicle* and is still looking for a reason to buy a CD-ROM player.

Paul Semel (beerhound@aol.com) writes for *The New Review of Records*, *Ray Gun*, *Sound Views*, *Buzz*, *Dupree's Diamond News*, and *The Splatter Effect*. He's also an editor of *Mixed Media*, a journal of art and literature.

John Starkovich is a musician and audio electronics maven who spends far too much time delving in the wonders of consumer technology.

Steve G. Steinberg (tek@well.sfc.ca.us) is the editor of *Intertek*, a journal about technology and society.

Scott Taves (staves@aol.com) is a music journalist and director of special projects at Reactor, an interactive software developer/publisher in Chicago. He's partial to machine music.

Howard Wen once wrote for *VideoGames & Computer Entertainment*. That was a long time ago. He sleeps – and lives – in the Dallas, Texas, area.

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See Me, Hear Me

Much to the chagrin of, say, members of the Internet Wilderness Society, multimedia development is fast encroaching on Internet back country: ASCII domination is being challenged by the likes of Mosaic and Internet video capability. While it helps to have a Sun SPARCstation and an MBONE (Multicast Backbone) feed, garden variety Mac and Windows machines (the Swiss army knives of the Internet) are worthy companions as you embark on video and audio online expeditions. Your computer will need its own numeric Internet address: SLIP and PPP will work, but they can be so sluggish that your connection will be reminiscent of a drive up a steep mountain road behind a Winnebago.

Internet videoconferencing for the masses comes courtesy of Cornell University's CU-SeeMe. Developed by Tim Dorcey,

Richard Cogger, and others back in 1993,

CU-SeeMe's been a big hit with the K-

12 Global Schoolhouse, as students and educators can now easily interact and evaluate collaborative projects. One noteworthy application was the CitySpace project at San Francisco's Exploratorium. During its run, students submitted digital images and objects for inclusion in a 3-D virtual world kept alive by a Silicon Graphics Onyx – a system more costly and temperamental than any sports car. Students all over the world were able to watch CitySpace's growth through regularly scheduled drive-throughs broadcast via CU-SeeMe.

For Macs, the minimum requirements to receive CU-SeeMe transmissions are a 68020 processor, System 7, a 16-level grayscale display, and MacTCP. Sending requires these plus a VideoSpigot (or AV Mac), a camera, and QuickTime. For Windows, minimum receive requirements are a 386SX, Windows 3.1, a 256-color video driver, and a WinSock-compliant TCP/IP stack. To send, you need a 386DX, everything listed above, a camera, and a Microsoft Video For Windows-compatible video

board (SuperMac's VideoSpigot or Creative Labs's Video Blaster will work fine).

Both versions install easily. After some trivial configuration, you'll open a receive or send/receive connection to the numerical address of another participant or reflector site. Reflector sites are Unix powerhouses that facilitate multi-participant conferencing.

Most come and go with the projects they support, but the following are usually available: CNIDR at 128.109.178.103; Cornell at 192.35.82.96; NASA Select at 139.88.27.43; NYSERNet at 192.77.173.2; or DHHALDEN at 158.36.33.3. Connect and you might find yourself in the middle of a multiwindow conference, or staring at a test pattern or empty office.

Once connected, each sender appears in a named window, which is cleverly refreshed in a checkerboard pattern. CU-SeeMe also displays data transfer and frame-per-second statistics. CU-SeeMe was implemented on the Mac long before being ported, so Mac versions usually contain a few features not found in the Win-

CU-SeeMe's been a big hit with the K-12 Global Schoolhouse.

dows versions. Most missing features are inconsequential, but the current Mac version comes bundled with Charley Kline's Maven, a Mac-only audioconferencing tool.

Developed at the University of Illinois, Maven supports a variety of encoding, quantization, and oversampling strategies for Internet audio, and operates in either a push-to-talk (mouse-activated) or squelch (voice-activated) mode. It's a natural for AV Macs and comes with an exquisite readme file.

Definitive versions of CU-SeeMe can be acquired at <ftp://gated.cornell.edu/pub/video>.

To get on the mailing list, send an e-mail message with `subscribe cu-seeeme-1` Your Name to `listserv@cornell.edu`. For definitive versions of Maven, travel to <ftp://k12.cnidr.org/pub/Mac>. To get on Maven's mailing list, send e-mail with `subscribe maven` Your Name to `listserv@cnidr.org`. CU online! – Eric S. Theise (`verve@cyberwerks.com`)

Thanks to Steve Cisler, the Henry David Thoreau of Apple, for introducing me to both the Internet Wilderness Society and CU-SeeMe.

Yours for the ASCII-ing

Perhaps your .plan needs some sprucing up. Well, if it's inspiration you need, check out *alt.ascii-art*. In addition to variations on the classic ASCII themes (cows, spaceships, Homer Simpson), this newsgroup boasts a menagerie of exotic wildlife, a showcase of ceremonial swords, a 90-line map of New Zealand, some Warhol-inspired ASCII Spam cans, and a gargantuan 3-D stereogram composed by a Lockheed engineer and entitled "Highway 101 on Friday Afternoon Before Memorial Day, in 3D." In this case, art imitates ASCII.

Help Is on the Way

If it's anarchy you face when searching for online files, *Anarchie* offers order within the chaos. A new MacTCP-based tool available as shareware from Peter Lewis (peter.lewis@info.curtin.edu.au), *Anarchie* searches Archie servers for files stored on anonymous ftp sites Netwide. Once the files are found, *Anarchie* neatly compiles a list for your perusal. A double-click retrieves the file via *anonymous ftp* (and also does the de-binhex) and then passes it off to a Stuffit decompressor if need be. *TurboGopher* requires several manual steps, and *Fetch* is great if you already know where to go, but *Anarchie* offers the best of both worlds. Peter doesn't just drop the program on you; it comes with a readme file, a quickstart, and a predefined list of Archie servers. You can also save aliases for ftp sites so you'll have bookmarks for later browsing (it even comes with a great list of predefined bookmarks). Furthermore, *Anarchie* 1.1.0 is scriptable and recordable, so future automation could potentially be very cool. Surf to <ftp://ftp.tidbits.com/pub/tidbits/tisk/mactcp/ftp/anarchie-120.hqx> to nab your own copy. Then send US\$10 to Peter N. Lewis at 10 Earlston Way, Booragoon WA 6154, Australia. Your search might just be over.

On the Wing

Birders will twitter over the AVES *Bird Related Information* server at <gopher://virtuvius.celer.army.mil>. AVES provides a nest for over 100 annotated graphics files of birds from around the world. These are some of the most beautiful images on the Net. Peruse the readme files, or – for those with .au or .wav sound capability – listen to the song of the Indigo Bunting. Audubon wouldn't have believed it.

Is It Green, or Is It Green?

If you want to know where your elected officials *really* stand on environmental issues, check out the *League of Conservation Voters's National Environmental Scorecard* Web site at <http://www.econet.apc.org/lcv/scorecard.html>. Here the league – the bipartisan political arm of the environmental movement – keeps a tally of how every member of congress has voted on environmental issues for the last four years. By counting only borderline votes on bills that can really do something for the environment, the league holds accountable those politicians whose words may be for nature, but whose hearts, wallets, and votes are for their corporate backers. You can also burrow in via *gopher* to <gopher://gopher.econet.apc.org> or send a blank message to the mail server at scorecard@econet.apc.org to get the same information. You may be dismayed by what "green" really means to the people on Capitol Hill.

On the Internet, No One Knows You're a Dalmatian

Surfers who like it hot – like brush-fire-in-the-Outback hot – should slide down their net.firepoles to <http://life.anu.edu.au/firenet/firenet.html>. Awaiting you is the *Australian National University's Firenet* site, offering fire news, bibliographic materials, meteorological data, mailing-list archives, and an expanding collection of educational material on rural and landscape fires. Also accessible via *ftp* and *gopher*, this site's a three-alarmer!

Dharma Bums

Questions to Cybermonk is a service offered by the senior monastics at Zen Mountain Monastery in Mount Tremper, New York. The service assists those individuals who have sincere questions about Zen practice and who do not have access to experienced practitioners or the support of a local meditation center. If you're out to impress or want to demonstrate your understanding of the Dharma, please save your comments for a more appropriate forum (i.e., a private interview with a Zen teacher). If your quest is in earnest, however, send e-mail to dharma@delphi.com, with *Question to Cybermonk* in the subject line. All questions are confidential and will be answered via e-mail only. Because of an already overwhelming influx of questions, it may take a week or more to receive a response, so please exercise query restraint and patience.

Breaking the Sound Barrier

For surfers whose choice of music is industrial, techno, electro, or goth, an archive of underground bands is available via *anonymous ftp* from <ftp://ftp.netcom.com> in */pub/cvoid/net-bands* (the *ftp.netcom* site is often at capacity, so you may wish to save yourself trouble by trying *netcom2.netcom.com*). Login as *anonymous* and cd to */pub/cvoid/net-bands*. A repository for underground bands reviewed in *Sonic Boom* – the monthly posting available in the *rec.music.industrial* newsgroup – this trove offers sound bites, lyrics, and reviews. The only downside to this archive is that it's run by a working musician, so there's often a lag between a review in *Sonic Boom* and its appearance in the archives. Nevertheless, cut over to this wave and expose yourself to some great (and not-so-great) underground cyberbands.

Laserdiscs Never Die

For "All You Ever Wanted To Know About Video Laserdiscs But Were Afraid To Ask," cruise to the *University of Iowa*, home to a 24-item menu of applicable files. Texts here, written by one Robert J. Niland, are ASCII based and go as far back as 1989. No file is newer than 1992. Though dated, the information remains valuable and the topics relevant. Consider it the perfect site to begin your laserdisc research.

Among the subjects covered are introductions to the laserdisc, imported discs and Surround Sound, suggestions for producers, care and repair, tips for retailers, and advice on player purchase. Fast forward to <gopher://chop.isca.uiowa.edu>, advance to item six, *General Information*, and hit "play" at *Information on Video*. Now hand over the remote....

ing hour of informative discussion. [Email net.series@wired.com](mailto:net.series@wired.com) to receive specific bios and schedule of speakers. Transcripts of each event will also be available for downloading in the WIRED Auditorium after the series is over. Get connected!

Wipeout!

"The number you have reached (for the Compact Disc Connection, *Wired* 2.04, page 124) has been changed. The new number is cdconnection.com. Please make a note of it."

.sig of the month

Morgaine ez030275@ucdavis.edu
"If you haven't got anything nice to say about anybody, come sit next to me." -Alice Roosevelt Longworth
Art work by Alan Greep, U of Essex!

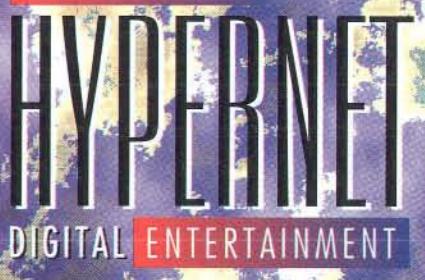
Getting Wired Advice

Looking for a local Internet connection? Need tips on the care and feeding of ferrets? Experience the "Getting Wired" Series, newly available to AOL users all through the month of September. Hear the thoughts and ideas of such Internet pros as Ed Krol, Adam Engst, Karen Coyle, Carole Leita, and Bernard Aboba as these Net.greats offer advice on connecting to and surfing the Net.

Drop in to the WIRED Auditorium (from AOL, type keyword *WIRED* and click on the Auditorium icon) beginning September 8, and continuing every Thursday night from 8:00-9:00 p.m. Eastern Standard Time, and participate in an illuminat-

Thanks to the *Wired* 2.09 Surf Team

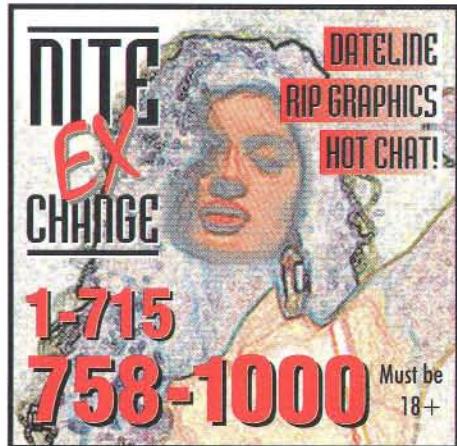
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If you're headed to Dallas for TLC '94...

Dallas. It conjures up images of urban cowboys, big-haired women, the unforgettable J.R. Ewing.... Is your cerebral juke box playing the theme song yet? For some reason, this glitzy metropolis surging from the flat, shimmering landscape of central Texas has yet to escape the unfortunate legacy of *Dallas*, or the Kennedy assassination, for that matter.

Dallas is truly a textbook of 20th-century architecture. More than anything else, the skyline reflects the influence of modernist architect I.M. Pei. See the **First Interstate Bank Tower** at dusk, when the setting sun glows against the cool glass exterior. The canted facade of Pei's famous **Dallas City Hall** resembles a piece of concrete pie standing on its point — sort of. Architecture buffs should also visit the **Kimbrell Art Museum** in Fort Worth, 30 suburban miles from Dallas.

As the site of President John F. Kennedy's assassination, Dallas lures the curious and the nostalgic. Part history, part national obsession, **The Sixth Floor Museum in the Texas School Book Depository** includes 400 photographs, four video stations, and two large-screen theaters documenting the life, death, and legacy of Kennedy. More than 30 years after the fact, the assassination and the multitude of conspiracy theories still captivate the nation: 400,000 people visit the museum every year. To avoid them, go early.

For a more lighthearted afternoon, skip off to **Fair Park** — a 277-acre collection of rare Art Deco buildings and formal gardens, mostly constructed for the 1936 Texas Centennial Exhibition. Although the city planned to remove the exhibition halls after

five years, the buildings were saved from demolition by the financial drain of World War II.

Urban cowboys, unlike the genuine article, prefer gourmet to grub. Dallas obliges with a wealth of ritzy ristoranti and quiet cafés. Nutritional nuts can count their cholesterol and lick their lips at the popular **Natura Café**. The crowded **Café Madrid** serves traditional Spanish tapas and paella on the weekends. For a true taste of Texas, chow down at **Del Frisco's Double Eagle Steakhouse**.

If you finish your homework early, head out to the funky Deep Ellum area, a five-minute drive from downtown, and saunter into **Sambuca**, a trendy Mediterranean restaurant and jazz bar. If you're superstitious, the three coffee beans in your sambuca will bring you luck, love, and life. Skeptics will still enjoy the music. For live alternative rock, don't miss **Trees**. Over in the Exposition Park area, grab a stool at the **State Bar**, where your fellow drinkers may have come from the symphony or the **Skin & Bones** tattoo parlor down the street. Also nearby is University Park, where java lovers can get a bottomless cup at any hour at **Café Brazil**.

Worthy of a paragraph unto itself, **The Lounge** is a Dallas jewel, set in the lobby of the old Art Deco **Inwood Theater**. Get a table in the back room, where you can watch the flick through a glass wall. Or just kick back and try to remember — who did shoot J.R.? Or J.F.K. — Jessie Scanlon

Thanks to the Texan twins, Cathy and Cindy Timberlake, and to the stately bartender, Jon Lagow. Not to mention Timothy Childs and Eric McQuaid.

DEDUCTIBLE JUNKETS

September 26-28

Electronic Books '94; New York City

It looks like last year's Electronic Book Fair is becoming an annual event. No wonder — just look at the growth in the CD-ROM market in the last year. Electronic Books '94, sponsored by Mecklermedia's *CD-ROM World* and *Internet World* magazines, will assess the take-off of digital publishing and its impact on traditional media and markets. Special topics include Publishing Challenges and Strategies, Transforming Old Media, Emerging Markets, Designs That Work, and Rise of Consumer Online Markets. Registration: US\$395 before September 11, \$445 after. Admission to exhibit hall: \$10. Contact: (800) 632 5537, +1 (203) 226 6967, fax +1 (203) 454 5840, e-mail ebooks@mecklermedia.com.

October 4-6

Consumer Electronics Show — Mexico; Mexico City

That giant sucking sound is CES going south of the border. The first CES Mexico promises to be a formidable extravaganza of audio, video, multimedia, and other nifty electronics products. Speakers are sure to focus on international trade issues as well as recent trends in the Mexican market — there are 22 million potential buyers in Mexico City alone. This business-to-business fiesta is expected to draw 25,000 attendees and more than 100 exhibitors. Registration: US\$50. Contact: +1 (805) 639 2280, fax +1 (805) 658 2882.

October 7-9

Virus, Hacking, and Computer Underground; Buenos Aires

Ever seen a hacker tango? The Virus, Hacking, and Computer Underground conference in Argentina may be your chance. This first-time conference, organized by *Virus Report* magazine, will cover the cyberworld, the Internet, phone systems, and programming, as well as the title subjects. The congress's open forum will feature speakers from the "official" world and the "underground," including Emmanuel Goldstein of *2600* magazine and Mark Ludwig, author of the *Little Black Book of Computer Viruses*. All events will be free, and foreign attendees will be housed by local hackers. Contact: Fernando Bonsebiante, +54 (1) 654 0459, fax +54 (1) 40 5110, e-mail fernando@ubik.satlink.net.

October 15-20

ACM Multimedia '94; San Francisco

The second ACM Multimedia conference will focus on the future of multimedia and what the hell it will actually do (minus the cynicism, of course). The international conference will be organized in two parallel "tracks." Sessions in the content creation track will be capped by a multimedia arts night, featuring the work of more than twenty renowned artists. In a separate track, industry leaders will discuss important legal, technical, and business issues facing the new industry. Registration: US\$425 before September 15, \$495 after. Tutorial fees are not included. Contact: +1 (508) 443 3330 ext. 1214, e-mail multimedia.dok@notes.compuserve.com.

October 26-28

Technology + Learning Conference; Dallas

The Technology and Learning Conference, sponsored by the National School Boards Association, brings district-level administrators together for three days of workshops, general sessions, and panel discussions aimed at helping public educators make wider use of technology. Speakers include Jaron Lanier, Seymour Papert, and teams of school-district leaders. During recess, play at over 250 exhibitor booths. Registration: US\$425. Contact: (800) 950 6722, +1 (703) 838 6722, fax +1 (703) 549 6719.

COMING SOON

HOTWIRED

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"It's filtered."

PENN

◀ 101 probability that an innocent man would match this DNA? And the answer is, of course, about one in a million," says Pike, looking around the table and pausing for drama. "The question they should ask is, *given the match*, what is the probability that he is *innocent*? And the answer is, about one-third."

I don't know what the hell Pike is talking about. Penn looks lovesick.

It's an unusually good turnout for tonight's Movie Night. Just about everyone at the table has an account on The Jungle.

In addition to Pike, there's Jamy Swiss, a man with a flowing Vandyke who Penn says is "probably the best close-up magician in the world," meaning he does tricks in front of two to three people at a time, card tricks and some

Garland jumps to his feet, faces the audience, and gives a brief introduction: "Good evening, Ladies and Gentlemen, and welcome to tonight's feature presentation, *Leprechaun II*, a hilarious romp through..."

Just like he always does.

When the rating "PG" flashes on the screen to announce a preview of a coming attraction, all 20 people say, quietly, "Yessssssssss." They repeat this each time a rating for a preview is shown. It's the first rule of Movie Night.

The other rules are simple: If the name of the featured movie is said during the movie itself, you applaud. If the name of any other movie is mentioned, you say "wow." You might try this sometime; the stupidest movie becomes a game show, with maximum audience participation.

In *Leprechaun II*, we said "wow" a lot: anytime the word "leprechaun" was said, since that's the name of the first movie. We never

"POLITICAL FREEDOM AND FREEDOM OF SPEECH ARE BECOMING TECHNOLOGICAL ISSUES, NOT FREE SPEECH ISSUES, AND I THINK THAT'S GOOD. NOW THAT EVERYONE IS GETTING ON THE NET - NOW THE GOVERNMENT IS WORRIED!"

involving coins. There's Chip Denman, a statistician at the University of Maryland, and his wife, Grace Denman, a computer person for Marriott. Chip and Grace are active in the skeptics movement, which seeks to debunk everything from facilitated communication to holy tortillas. There's David Shaw, a biochemist working on a cure for cancer up in Cambridge, and his wife, Diane Martin, a lawyer. (The out-of-towners came in for the weekend and are planning to go to the Penn & Teller show in Atlantic City tomorrow.)

Barry Marx is here as well. Marx, at Absolute Entertainment Inc., a videogame production company in New Jersey, is producing the Penn & Teller videogame, which will be available for the Sega CD platform this winter.

To round it off, Colin rolls in.

Someone asks Garland what we're going to see tonight.

"I'm leaning toward *Leprechaun II*," he says. Everyone groans.

Across Broadway and two blocks south, the AV Squad sits in the front row, just as they do every Friday night, passing around a large bucket of buttered popcorn and a bag of Twizzlers. As the lights dim and a garrulous drunk in the back hoots insanely,

got to applaud, however.

The movie is about a savage leprechaun, who, pretty early on, eviscerates a wino. "This is already better than *Clifford*," says Penn. The worst of the 250 or so movies he's seen on Movie Night was *Sister Act*, the Whoopi Goldberg vehicle. It's hard to say what the best movie was, though he says they "saw *Leonard Part 6* three times. It was an amazing movie. None of us could figure out what they were trying to do. We were just dumbstruck."

A few hours of sleep later, I hop into a stretch limo with Penn, bound for Atlantic City, where Penn & Teller are scheduled to do two shows tonight. It's about noon, Day Two.

Penn puts a cassette tape into the deck; the tape is from his band, Captain Howdy. Lou Reed wrote one of the songs, called "Tattoo of Blood," which is about the time Penn had a tattoo done, without ink, just to see what it would feel like.

Most of the way down to Atlantic City, we talk about interactive entertainment. Penn says it'll never work. Entertainment - movies, theater, music, art - boils down to the performer, not the audience, being in control.

"Technology adds nothing to art," he says.

"Two thousand years ago, I could tell you a story, and at any point during the story I could stop, and ask, Now, do you want the hero to be kidnapped, or not?" But that would, of course, have ruined the story. Part of the experience of being entertained is sitting back and plugging into someone else's vision.

"The fact of the matter is, since the beginning of time, you could buy a Picasso and change the colors. That's trivial. But you don't because you're buying a piece of Picasso's fucking soul. That's the definition of art:

ART IS ONE PERSON'S EGO TRIP!"

Penn says he and Teller "have been offered a huge amount of money and a huge amount of technology to do interactive shit. We have turned them down. Not that the technology wasn't up to snuff, but because we don't have any ideas."

"The whole fucking world is pretending the breakthrough is in technology," he says, as we whiz by the *Blade Runner*-like landscape of New Jersey oil refineries. "The bottleneck is really in art."

It is only natural that Penn, the magician, should have an intimate understanding of the relationship between technology and art. Or more specifically, technology and the art of magic.

Technology is, and always has been, an important tool in the magician's bag of tricks, explains Teller. Though he never talks on stage, off stage Teller is a marvelous talker, a historian of magic, and now, in the hour or so before their first show, he's holding forth during dinner at an Atlantic City hotel.

Magicians have always exploited new technologies, from Jean Eugène Robert-Houdin, who used a trick involving an electromagnet to quell a rebellion in Algeria in the mid-19th century, to, well, Penn & Teller.

Teller quotes Arthur C. Clarke, who noted, "A sufficiently advanced technology is indistinguishable from magic."

Eight years ago, Penn & Teller devised a trick that illustrated Clarke's Law, Teller says. You might recall this number - the World's Most Expensive Card Trick - done before millions of people on *Saturday Night Live*.

While the *Saturday Night* audience watched Teller sit on stage surrounded by computer equipment, Penn was out in Times

Square, "by a newsstand," Teller recalls. "Penn had two passersby select one card from the pack and remove it. He then fanned the cards so the TV camera could get a glimpse of the 51 others. I apparently captured the fan on my computer scan, and took a still frame to determine which card was missing. I turned to a second terminal and typed in Four of Diamonds. The terminal transferred it to the giant Spectacolor screen in Times Square: Penn just looked over the bystanders' shoulders, and there it was."

"All that elaborate rigamarole could have just as easily been done by a standard palming of the card," he adds. In fact, the trick was done like this: The "bystanders" were really two actors. And the answer was always going to be the Four of Diamonds; that was the card that the actors had been instructed to select. But what everyone saw was an incredible stunt done by powerful, mystical computers.

"The subject of that trick was how close to magic being able to manipulate a lot of technology is," Teller says.

I am a little shocked at this admission. Call me a sucker, but I always figured magic tricks, especially the Penn & Teller kind, were far more sophisticated displays. And now, this glimpse behind the scenes makes me feel uneasy. It makes me think, again, that the Penn I have been watching is a setup, too.

Without even saying this to Teller, I must have conveyed it, because he says then, "I have worked with Penn for 20 years and have seen probably every face there is to see. Under all the veneers of flamboyance is someone of impeccable integrity. After all, I am literally trusting him with my life."

Penn Jillette is grasping one end of a red rope. The other end is holding up Teller, who's cinched tight in a straitjacket, and hanging upside down from the ceiling, dangling over a bed of 18-inch-long, sharp, wooden spikes.

Penn has just hoisted Teller aloft for the benefit of about 800 people here, in Bally's Grand Hotel, for the 11 p.m. show, and if he lets go, Teller will surely be impaled on the spikes. Mr. Gravity guarantees that.

Now Penn lashes the rope to a flimsy red folding chair, then plops himself down onto it and says: "Good evening. We are Penn & Teller, and you've probably heard by now that we do magic..."

He sighs loudly, opens a book of poetry, and quickly finds a selection by Ernest Lawrence Thayer, "Casey at the Bat." This poem, he tells the audience, will take him 1 minute and 34 seconds to read. "Afterwards, I will jump to my feet and take that all-important bow."

In other words, unless Teller escapes, Penn will skewer him like a corndog on a stick. I don't think I'm giving anything away by saying that Teller escapes, only to eat a fistful of nails in the East Indian Needle Mystery and live without air for eight minutes in Teller's Underwater Coffin. Penn, among other things, smashes three liquor bottles and juggles the knife-sharp shards.

I, for one, am starting to go ga-ga. It's been 36 hours of Penn watching, and I've yet to see him do something that isn't wired. My whole definition of "wiredness" has grown, too. I see that in addition to owning decent gadgets and having a career that works the edge in a dangerous but creative way, being wired means being closely connected to people as well: your partner, your pals, your co-workers.

HOTWIRED

Penn Jillette will appear in the Wired Auditorium with Joshua Quittner on September 1 from 7 to 8 p.m., Pacific Daylight Time. From AOL type the keyword "wired" and click on the Wired Auditorium icon.

In the limo back that night, we try to watch a video, an awful movie about a savage sniper in a jungle war, who, early on, eviscerates a Contra. It's 5:30 a.m., and it's all we can do to say "wow" and applaud at the appropriate places.

A few weeks later, I drop by Penn's apartment to hear him rant. I figured ranting - really showing passion about certain topics - is the blood test of the truly wired. I find Penn going through his e-mail at his desk, sipping a Blenheim Ginger Ale, from Blenheim, South Carolina - his new cult-fave drink - and Colin is hovering around, fetching him stuff. The Voice Organizer is recharging in its holster.

"Rant for me," I say.

"OK, let's talk about Fat Boy and the Acid Head," he says, referring, of course, to the US president and vice president. "First of all, he lies about how far he runs every day. That's why I call him FAT BOY. He's the third fattest

president in US history - which I don't hold against him, because I'm fat, too." (Penn is ranting so fast, I can't keep up. I should have brought a tape recorder. I'm getting like, one out of every three sentences now.)

"He once said he could run faster than a Navy Seal. THERE OUGHT TO BE A RULE: IF A PRESIDENT CAN OUTRUN A NAVY SEAL, THEY BOTH OUGHT TO BE FIRED." The Navy Seal ought to be fired for obvious reasons, the president because if he can outrun a Navy Seal, he's spending too much time running and not enough time managing affairs of state. Rant, rant. He's picking up speed, like one of those nuts that calls late-night talk radio, oblivious to time, to what people might think, about to explode.

"People always talk about what A REGULAR GUY Clinton is, and I do believe that, he is. A regular guy. THAT'S WHY I DON'T WANT HIM TO BE PRESIDENT." The last president Penn liked was Thomas Jefferson, he says. "Thomas Jefferson was not a regular guy. HE WAS A PRESIDENT."

Now Penn turns to the information superhighway, ranting like a crank at a city hall public hearing. "Fat Boy and his sidekick, algore - you say it like that, real-fast, like Igor ... algore - are doing nothing to speed up the construction of the information superhighway. All they're doing is slowing it down. They ought to just step back and let free enterprise handle it."

Yessssssssss.

Net access for all? Not on your life. A bone-headed idea, says Penn. "I defy the Acid Head to name one fucking show poor kids need to watch on cable," he said. "Taking television away from poor people is the BEST THING YOU COULD DO FOR THEM. Rich people turn the TV off SO THEY CAN READ."

Technology, though, is the key to protecting free speech, he screeches. "Fat Boy is doing the most Luddite, anti-technology thing possible with the Clipper Chip. Political freedom and freedom of speech are becoming technological issues, not free-speech issues, and I think that's good. Now that everyone is getting on the Net - 23 million people, 10 million within the last year, an incredible figure - NOW THE GOVERNMENT IS WORRIED!"

His head is about to burst into flames, the man is so wired.

Someone asks him, What about Hillary?

And Penn pauses, his eyes gleaming, his hair electrocharged, his heart pounding, and Blenheim Ginger Ale coursing through his veins. Penn says: "I have nothing to say about her." Clearly, even Penn Jillette has his limits. ■ ■ ■

Universal Service

► 105 Now that politicians are bent on creating competition in local telephone service, they propose to put universal service on a new footing. Although the details and exact timing are to be worked out by the FCC, the Congressional consensus is that instead of internal cross-subsidies, from one part of the monopolist's network to another, everybody offering network services should pay into a single fund. The government will take money from this fund to subsidize "essential" services. At the same time, a regulatory task force will examine ways of redefining "essential" services, asking the question of what constitutes an acceptable minimum of service on the new networks. A touch-tone tele-

of long-distance telephone services, and others, to those providing "essential" services. First, the funds always seem to require more money than expected. The Universal Service Fund – which, confusingly, is only one of several funds to provide the subsidies involved in universal service – transfers money from long-distance telephone companies to local telephone companies that have "high-cost" networks. Originally budgeted at under \$400 million a year, the fund has in recent years been growing at about five times the rate of local-telephone costs. Worse, the FCC cannot be confident that the funds are all being put to their intended use. Even with the best of will, it is nearly impossible to say how much of the costs of a single switch are accounted for by subsidized essential services

group's use is to discourage another's – and the greater the encouragements, the greater the corresponding discouragements. History shows that the discouragements can become very large indeed as politicians and regulators try to bend the market to make it more "fair." By 1980 universal service cross-subsidies accounted for more than three-fourths of the fees that AT&T charged customers using its switches for long-distance calls (as Peter Westerway points out in his book, *Electronic Highways*).

One problem here is that universal-service charges may discriminate against small firms in emerging markets; charges that seem a pittance to a big firm in an established market can break the back of a small firm in a new and emerging market. Given that schools, libraries, hospitals, and homes are all on most people's list of worthy causes meriting special network treatment, pretty much the only pockets left to reach into belong to business.

But overcharging business to subsidize others can create a variety of problems. Higher prices may put network services beyond the reach of some business customers – particularly small businesses, who in theory could reap some of the greatest benefits from the free flow of information created by networks. They might discourage risky, innovative network services for which markets are not yet proven – tilting the balance further in favor of entertainment and other big, well-established markets. And higher prices discourage investment in the networks that businesses are now building for themselves, which, like the Internet, are becoming a key part of information highways.

Why tax the people who are building and using advanced services in favor of the big-company wannabes? For universal service is effectively a subsidy for the status quo – taxing new and innovative services and handing the money to existing providers of existing services. Colleen Boothby, now a telecommunications lawyer with Levine, Lagapa & Block in Washington, DC, but for many years a regulator at the FCC, makes an analogy to that capitalist archetype, the better mousetrap. "If you build a better mousetrap, people beat a path to your door; but what these cross-subsidy regulations do is to force anyone wanting to buy one of the new mousetraps to pay for some old mousetraps too."

Worse still, the introduction of competition to telecom markets thrusts the search for answers to these vexed questions into the realm of special-interest politics. When AT&T was a monopoly, fiddling with rates on individual services – to make the socially desir-

Universal service cross-subsidies are a tax – albeit a tax buried beneath layers of obscure cost allocation and pricing regulations.

They are a particularly inefficient and wasteful tax.

phone? A digital telephone line? A TCP/IP connection? Or what?

That universal-service fund will contain a lot of money. Estimates of today's universal-service cross-subsidies run as high as \$20 billion a year. That money will provide a lot of network-shaping power for the politicians and bureaucrats who control it.

Four simple questions befove the proposed universal-service fund.

Who gets subsidized? Today's recipients are mostly the poor – in California, low-income customers can get "lifeline" telephone service at \$4.18 a month – and residents of rural communities, who get telephone service at the same rates as urban householders. Not surprisingly, though, there is no shortage of candidates thought to be deserving of a subsidy or two should politicians decide to broaden the scope of the fund. Hospitals, for example, rank alongside schools and libraries on many people's (including Al Gore's) list of causes deserving cut-rate network access. Yet a study by the consulting firm Arthur D. Little estimates that as health care providers change their practices to make more intelligent use of the capabilities of advanced networks, the eventual savings will total as much as \$36 billion a year. Surely hospitals do not really need a subsidy to inspire them to save themselves money.

How to monitor the subsidies? Universal-service subsidies are a perennial nightmare for the FCC, which already administers several funds to transfer money from providers

and how much by the other services delivered over its wires – and, as the FCC well knows, big companies have every incentive to exaggerate the costs eligible for subsidy.

What services to mandate? Today, as traditionally, the basic telephone services mandated as "universal" are at the trailing edge of the technology. But as excitement mounts over the world-changing potential of new network technologies, more and more proposals would have government require companies to provide services at the forefront of technology in order to accelerate the pace of change. However well-intentioned, the problems with such proposals are obvious. Nobody really knows what essential "basic" services for an advanced network might be. Gore and other advocates of universal service say they will not allow the creation of have-nots, but they do not define what a have-not might be. Someone without a telephone? (Even with flat-rate "lifeline" services available at \$4.18 a month, some 4 percent of Californians don't have telephones.) Someone without a television? Someone without a SLIP connection to the Internet? Worse, to define have-nots, policy makers would also have to define haves, which pushes them into the business of picking technological standards – and, hence, winners. It is one thing for the market to choose Windows and DOS as the most popular technology, and entirely another for the government to mandate it so.

Who pays? If somebody is to get network service at or below cost, somebody else has to pay above the odds. So to encourage one

Elements in Congressional Legislation

Three key pieces of legislation underlie proposed reform of telecommunications.

Although Congressional leaders hoped to pass a bill for President Clinton to sign by September 1994, they were still wrangling as *Wired* went to press. Both the Markey-Fields bill and the Brooks-Dingell bill passed in the US House of Representatives in late June. When – and if – the Hollings bill passes in the US Senate, the separate pieces of legislation would be reconciled by a joint committee of both Houses before becoming law.

Markey-Fields

National Communications Competition and Information Infrastructure Act of 1994; named for sponsors Rep. Ed Markey (D-Massachusetts) and Rep. Jack Fields (R-Texas).

The linchpin of telecom reform, this bill, passed on June 28, creates competition in telecommunications markets, where previously only monopolies existed. It does so in three steps:

- Local-telephone competition. The bill removes restrictions that prevent competition for local-telephone monopolies. It requires the FCC to specify the terms under which competitors can connect their equipment and services to existing telecom infrastructure. The idea: competitors should enjoy access of the same technical quality

and cost as the former monopolist.

- Cable-television competition. The bill allows local telephone companies to offer video programming in competition with cable television companies – so long as they manage such operations in a separate subsidiary, unsubsidized, at arm's length from the telephone business.
- Universal service. The legislation establishes a board, composed of federal and state officials, to examine what regulations should be enacted to ensure that basic telephone service remains both ubiquitous and affordable. It establishes a fund, to which all providers of telecom services will have to donate, to pay for the board's recommendations. And the legislation directs the FCC and the board to examine promoting end-to-end digital service for basic telecom service.

Brooks-Dingell

Antitrust Reform Act of 1993; principal sponsors are Rep. Jack Brooks (D-Texas) and Rep. John Dingell (D-Michigan).

This bill lifts restrictions placed on telephone competition by a 1982 agreement between AT&T and the Justice Department in a settlement of a federal antitrust suit. It allows the seven RBOCs created by AT&T's breakup to manufacture telecom equipment

and offer long-distance and previously banned information services.

Hollings

Communications Act of 1994; key sponsor is Sen. Ernest F. Hollings (D-South Carolina).

Hollings's bill is the Senate complement to Markey-Fields. It encourages competition in the telecom and cable industries, gives the FCC more regulatory flexibility, and ensures the preservation of universal service.

- It requires all carriers to contribute to a universal service fund.
- It removes manufacturing restrictions on Bell companies and permits them, with certain restrictions, to enter electronic publishing and burglar alarm services. It also gives the FCC authority to allow a Bell company into long-distance service.
- It restricts telephone companies from providing cable service outside the regions where they provide phone service.

As written, the Hollings bill would restrict local-telephone companies as they move to related markets. Bills from the House are more lenient, in hopes of encouraging competition. Potential restrictions range across federal and state authorities. Lobbyists are likely to argue the issue long after the votes on the Communications Act of 1994 have been cast and forgotten.

able ones cheap and others expensive – was a zero-sum game. So long as AT&T made a reasonable total profit at the end of the day, it was not much bothered about the details of individual services. Many of the companies introducing new technologies into competitive markets, however, care very much about individual services because that is all that they do. Internet providers, operators of wireless data networks or cellular telephone services – and their lobbyists – will all argue vehemently, and with honest conviction, that their service is crucial for fulfilling networks' potential to change the world. Brokered compromises to lobbyists' battles are unlikely to prove the best foundation on which to build the future. Indeed, the arguments could make decision-making so slow as to render the universal service system unworkable.

Universal excess

The fact that universal service is difficult to administer is not by itself a compelling argument for burying it – even slowly and with great respect. But many of the same changes that complicate the practice of universal service also undermine its moral foundation.

Since the Post Roads Act of 1866 – which in return for the right to string wires along public roads required telegraph operators to carry, without discrimination, the messages of anybody who wanted to use those wires – America's government has based its regulation of electronic media on the assumption of shortage. The Post Roads Act was in large part inspired by a nearly successful attempt by telegraph operators to put the fledgling Associated Press out of business by refusing to carry its messages, which competed with their own news services. To prevent other such abuses of power, the regulation of radio, television, and telephones has been based on the idea that those scarce resources must be regulated for the public good. Technology and competition, however, now promise to turn shortage to glut.

Yet, all of the proposals to bring competition to network markets are predicated on the idea that technology will create, if not excess, at least an adequate supply of bandwidth and electronic expression so that new information services will be freely available. Rep. Ed Markey, chairman of the House Subcommittee on Telecommunications and

Finance, says "someday, choosing which network to use will be no different from choosing which kiosk on Harvard Square to buy your newspaper from." Russ Neuman of MIT's Media Lab argues that someday soonish most homes will have a choice of connecting to five high-capacity networks: one built on the telephone system, one built on cable television, one built on the electric power network, a wireless network for personal communications devices, and another wireless network built from the spaces freed up in the radio spectrum as today's analog television signals go digital.

With the advent of real choice, the moral bargain underlying universal service – that in return for the use of scarce public resources, telecom companies must give service back to the community – becomes largely void. If the resources are not scarce, then the moral duties owed the community by telecom providers are no greater – and no less – than those owed by other firms. The way to recognize that change, and to eliminate many of the innovation-crushing practical difficulties in administering universal service, is to change emphasis from regulation based on

Universal Service

service to regulation based on access.

Open access regulation focuses on opportunity rather than duty. Instead of saying what services networks should provide at what price, the point of access regulation is simply to require big network operators to make available to everybody, on a non-discriminatory basis, whatever services they do provide – and, importantly, the underlying technologies from which those services are constructed. It lets customers decide what services they want. Better, unlike mandated services, mandated access promises to break open entrenched cable-television and telephone monopolies so that competition and choice can begin in earnest.

The regulation of radio, television, and telephones has been based on the idea of scarce resources. Technology and competition, however, now promise to turn shortage into glut.

An easy way to see the difference between access regulation and service regulation is to consider the “set-top box,” the computer on the TV which will provide brains for interactive multimedia entertainment.

Service regulation is when the government specifies a minimum level of service, and sets rates for those minimum services – as cable regulators do now. In set-top-box terms, the regulations might require, say, 200 channels for \$25 a month. Access regulation would set neither rates nor service requirements; the assumption is that competition will keep pressure on price and quality. Instead, access regulations force companies to offer services to all customers – without, for example, requiring that somebody buy its telephone service in order to watch its movies on cable television. More important, access regulations also require big, entrenched companies to make available to competitors the components from which their services are constructed. In set-top-box terms, this means that customers gain the right to buy, say, cable programming from Time Warner, a set-top box from Ted Turner, and intelligent agents from General Magic – or whichever company offers the best services (whether it be the firm who laid the wire to the door or not). Time Warner, for its part, has to offer an interface from its cables to Ted Turner’s set-top box with the same price and performance as that offered for its own boxes.

Access regulations thus boost choice and competition at two levels. First, they eliminate the possibility that existing companies

can use their huge investments in infrastructure to squeeze out new competitors. The regulations would enable anybody and everybody to have access to, say, installed coaxial cable at roughly the same price at which the cable companies’ accountants charge the costs of that cable to their own businesses. Second, they enable customers to mix and match various offerings from a variety of companies to create services they want.

Universal access works successfully in long-distance telecommunications – where competition fueled by access regulation has improved quality and choice even as it has reduced prices. So legislators have incorporated an ambitious variety of access regulation into legislation – particularly into the Markey-Fields bill. Not only does the bill

require big companies to give competitors intimate access to their networks, it also requires them to keep expanding those networks so that lack of capacity cannot itself become a constraint on access. Telephone companies venturing into cable would be required by Markey-Fields to build as much cable capacity as there was demand for channels – with the FCC to define “demand for channels” – and to make it available to all on equal terms. The hope, at least, is that electronic innovation and electronic bandwidth will become the printing press of the next millennium – and that cheap, easy-to-produce video ‘zines will surge alongside the paper ones as technology’s contribution to the ability of all the artists, college students, political activists, lunatics, and sports fanatics to express themselves.

Abandoning universal service need not mean abandoning equality. On the contrary. If information services are essential and high cost is denying these services to the poor, government can give the disadvantaged the means to buy some minimum level of service – as it does now with Medicare and food stamps. (After all, nobody is suggesting that restaurants should pay more for food and supermarket prices should be regulated to provide cross-subsidies for universal service of nutrition among the poor.) Equally, instead of requiring cable operators and other information-service providers to set aside capacity for free (or at least below cost) community broadcasting, government can encourage the growth of capacity and provide grants for

those whose voices it reckons should be heard – as it now does for artists. There are already interesting experiments along these lines. Both the Commerce Department and the Corporation for Public Broadcasting have recently created grants for community-oriented networks. New York state has experimented with novel ways of financing telecoms for the very poorest.

But in order to take these experiments further, politicians throughout Washington – and particularly Al Gore – will have to indulge in an uncomfortable honesty. To imply, as Gore now does when he “challenges” network providers to wire every school, hospital, and library in America by 2000, that it is possible to provide ubiquitous, high-bandwidth networks without either new taxes or high prices for some new services. Universal service cross-subsidies are a tax – albeit a tax buried in the price of services and beneath layers of obscure cost allocation and pricing regulations. They are a particularly inefficient and wasteful tax. And, worst of all, they are a deceptive and distorting tax, a tax that makes it hard to see the real costs of the building blocks of tomorrow’s networks and thus the real opportunities in building the networks that will change the world. That is no foundation on which to build the future. If networks are indeed the future of America, at least the nation should begin building them as it would speak over them – with honesty at all times, even when the honest message is not the one people want to hear.

More important, honesty underlies the sort of regulatory system in which networks can realize their potential. By pushing companies to offer network services at something like the cost of providing them – instead of a fictional price connived for social convenience – regulators can put networks on a sound economic footing, and so make them independent of the whims of politics and subsidy. By requiring entrenched giants to provide basic technology to others as they provide it unto themselves, regulators can set free the vast investments already made in telecom infrastructure for expansion and innovation, and so fulfill the public trust that built them. By allowing innovation to rise or fall on its own merits – rather than because of lobbyists’ pressure – regulators can enable Americans to choose for themselves the way they would like to communicate, to learn, and to use the vast potential of the new technology they are creating. Building upon the sound foundations of real competition and honest pricing, people can begin to build for themselves the sorts of networks they want – rather than waiting to be served. ■ ■ ■

The Wrong Stuff

◀ 113 Apollo hoax. "I was aware that there were people who believed that we never walked on the moon, but I never read their books or consulted with them. And frankly, I think they are being totally ludicrous." (Nevertheless, an invitation to a sneak preview screening at the time of *Capricorn One*'s release said: "Would you be shocked to find out that the greatest moment of our recent history may not have happened at all?")

The concept of the moon swindle holds a certain appeal for other filmmakers as well. In *Diamonds Are Forever* (1971), James Bond accidentally stumbles onto a movie set that consists of rocks, a lunar backdrop, and a vehicle that looks like NASA's Eagle. Men in spacesuits move about slowly and clumsily, as if simulating low gravity. Bond's pursuers give chase, but 007 – stirred, but not shaken – climbs into the lunar lander and makes his escape. The scene is never explained. In the high-tech thriller *Sneakers* (1992), Dan Aykroyd's character, a gadgeteer and conspiracy enthusiast, refers to the moon landing by casually remarking: "This LTX71 concealable mike is part of the same system NASA used when they faked the Apollo moon landings." And a small San Francisco Bay area production company with a big name, Independent Film and

Although very few Americans subscribe to the more grandiose theories, millions of people doubt the authenticity of the lunar missions, much to NASA's exasperation.

Video Productions, is working on an as-yet-untitled feature film in which a writer discovers that the moon landings may have been simulated – and then nearly gets killed in his quest for the truth.

Simulating One-Sixth Gravity

Technically speaking, could the moon landings have been faked? Was the state of special effects advanced enough in the late '60s to fool even the most discriminating eye? Simulating one-sixth gravity could have been done with the use of hydraulic cranes and thin wires – the Peter Pan approach – or by filming scenes under water, says Dennis Muren. Muren, an eight-time Oscar winner, is the senior visual effects supervisor at Industrial Light & Magic, a division of Lucas Digital. He was responsible for making the *Jurassic Park* monsters come alive and for key scenes in *Terminator 2*, *Star Wars*, and *The Abyss*.

"A moon landing simulation might have looked pretty real to 99.9 percent of the people. The thing is, though, that it wouldn't have looked the way it did. I've always been acutely aware of what's fake and what's real, and the moon landings were definitely real," Muren stipulates. "Look at *2001* or *Destination Moon* or *Capricorn One* or any other space movie: everybody was wrong. That wasn't the way the moon looked at all. There was an unusual sheen to the images from the moon, in the way that the light reflected in the camera, that is literally out of this world. Nobody could have faked that."

Of course, Bill Kaysing will have none of it: "Perhaps this guy [Muren] was part of the cover-up. Anything is possible." Kaysing likes to paraphrase Alvin Toffler: "He writes that most people are producer/consumers – he calls them prosumers. They go through life not questioning anything, not knowing anything. Ninety percent of the American population has no idea what's going on in this country. I'd like to be the one to tell them – tell them at least part of it. I'm either going to share the truth about the moon with them, or I am going to die trying." ■ ■ ■

Moon Hoaxes of Yesteryear: Pigs Might Fly

Not to rain on anyone's parade – but a balloon-faring Dutchman walked on the moon some 140 years before Neil Armstrong did. In the *Southern Literary Messenger* of June 1835, Edgar Allan Poe published the first installment of that prodigious fable, which he unsuccessfully tried to pass off as a genuine news story.

Fed up with his miserable life in Rotterdam, one Hans Pfaall, an unemployed bellows mender, secretly built a giant balloon. His goal: "to force a passage, if I could, to the moon." He gambled that he would gradually get accustomed to the very high altitudes. Pfaall purportedly took off on April 1, and, because of the thinning atmosphere, soon suffered spasms and began bleeding from the ears, nose, and eyes. He made it though: after 19 days in space, the Flying Dutchman landed in a crowd of ugly little moon people, who "stood like a parcel of idiots, grinning in a ludicrous manner, and eyeing me and my balloon askant, with their arms set akimbo."

Despite the awkward welcome, the world's first astronaut lived among the unsightly critters for five years, then wrote a letter to the Mayor of Rotterdam in which he described some of his experiences and negotiated his return. A lunar messenger whom Pfaall had entrusted with the missive did reach the city (by balloon, of course) but couldn't be persuaded to land; after dropping off the letter, he disappeared into the heavens without waiting for a reply – no doubt, Poe muses, "frightened to death by the savage appearance of the residents of Rotterdam." (Poe's story is recounted in *Media Hoaxes*, a book written by Fred Fedler and published in 1989 by Iowa State University.)

Imagine a telescope lens with a diameter of 24 feet and a weight of almost 15,000 pounds. With it, you could see insects on the moon. OK, so there is no life on the moon – but that's not what the readers of the *New York Sun* were told. In August 1835, the penny paper reported the "findings" of the British astronomer Sir John Herschel. In a six-part series, reporter Richard Adams Locke wrote that the scientist, using a huge custom-built telescope in a planetarium at the Cape of Good Hope (at the southern tip of Africa), had spotted many spectacular species on the moon. Among them: horned bears, tailless beavers, and 4-foot-tall ape-like creatures with thick beards and large wings. Locke referred to them as "bat-men." Actually, there were plenty of bat-women too, and the two sexes engaged freely in behavior that Locke declined to describe – it would have been "improper" on earth.

Herschel was a legitimate, respected scientist who remained unaware of his fictional discoveries for months. When word of Locke's elaborate yarn reached him, he reportedly laughed and tried to expose the hoax – to little avail.

On June 20, 1977, Anglia TV in England caused a nationwide stir when it broadcast a documentary called *Alternative Three*. By linking facts with half-truths, and by staging interviews with so-called "astronomers" and "astronauts," the makers suggested that both NASA's space program and the Cold War were decoys. The power élite in the USSR, the US, and Great Britain had in fact been working together on a secret project – Alternative Three – that had established bases on the moon and on Mars, so that they could escape the coming ecological nightmare on earth. Insiders who were deemed a security risk were callously murdered. Scientists had been abducted to do experiments in the space colonies. Even ordinary folks had been snatched and forced into slave labor on the moon and on the red planet.

Surprise! It was all a hoax, made clear by the closing credits that listed the actors on the show and that contained a copyright notice dated April 1. Nonetheless, Anglia was flooded with calls, and newspaper headlines reported "shock" and "panic." To this day, some people believe that all of it, or some of it, is true.

◀ 129 tration as they compare prices on cut-rate 486 chips. In the larger basement section across the street, crowds of Taiwanese nerds sift through bins of transistors and diodes, inspecting serial cables and math coprocessors, searching for that last part necessary to get their jerry-rigged clone up and running.

Many of the people who visit the KuangHua Market have jobs with one of Taiwan's thousands of small or medium-size high-tech companies. A generation ago, most of them fled the country to become electrical engineers (Double E's) working abroad. In recent years, many have come back, a reverse brain drain that says volumes about how the country has changed in the past several decades.

There are now thousands of fluent English-speaking Double E's in Taiwan with PhDs from the United States who earlier spent years working for top US research laboratories and earning four times what they could in their native country. Throughout the '50s, '60s, and '70s, the exodus marked an embar-

products in the world: the government established the park; government-funded research institutes feed new technological breakthroughs to the park; and the government is a significant investor in many of the park's largest enterprises.

According to Lance Wu, the deputy general director of Taiwan's Computer and Communication Research Laboratories, more than a thousand Taiwanese scientists and engineers have returned from overseas to work in the Hsinchu area in just the last two years.

Besides the promise of good jobs in their homeland, a number of other factors contributed to the expatriates' homecoming. The US recession in the late 1980s eviscerated a once-thriving job market. The Kuomintang unleashed an aggressive government recruiting drive, offering cheap housing, high salaries, and other forms of government support. To encourage business, the government offered a sheaf of tax breaks and R&D grants, including a 30-percent tax break per dollar for "strategic" investments of over US\$40 million in a Hsinchu-based enterprise.

streets, all sound the same: UMAX and Climax, Multronix and Microtek, Datatech and Yangtech. No traffic, no garbage, no noise - this planned community is one of the few places on the island where Taiwan can be fairly accused of modeling itself on Singapore.

But the calm is only skin deep. This "park" is no pastoral playground. Last year, some 150 businesses and 13,000 workers there pumped out US\$5 billion worth of high-tech hardware. About half of that came in the form of integrated circuits.

Tsao's company, ALFA Inc., has its fingers in a number of telecommunications pies, including FDDI-based networking systems and PCMCIA cards. FDDI (Fiber Distributed Data Interface) networks provide a data transfer rate of 100 Mbits per second, and they're crucial, Tsao says, for effective multimedia networking. He enjoys showing off his Spartan offices, little more than a collection of open cubicles, where workers peer at dense circuit boards and flash their fingers across the keyboards of Taiwanese-made Spare II workstations.

Hsinchu is a focal point for a worldwide network of joint ventures and technology transfer, much of which is fueled by the personal relationships established by these scientists during their sojourns abroad. For instance, Tsao's ALFA works hand-in-hand with AT&T. Philips owns shares in Taiwan Semiconductor Manufacturing Co., one of the largest semiconductor companies in Hsinchu. Many of the returnees have left their families in the US, have American passports, and flit back and forth between their old companies in Silicon Valley and their new businesses in Hsinchu.

Tsao, as well as most Taiwan engineers, asserts that one of Taiwan's main strengths is its preponderance of small and medium-sized enterprises (you can't shoot a gap in the traffic with a Winnebago). But there is no agreement as to how Taiwan's economy came to be dominated by small enterprises. One theory has it that the mainland-originated Kuomintang government saw any large native Taiwanese company as a political threat, and therefore tinkered with the tax laws to discourage their formation. Still, there isn't any dispute about the current role of thousands of motorcycle-like small businesses - particularly in the computer industry. In 1989, the island's top 20 computer companies made only 50 percent of its computers.

But when Taiwan's engineers are asked about the future, they lapse into a collective pursing of the lips. No one seems to think that the government's plans for a Software Park - for several years the government has been

"I tell them, 'My Mercedes is on my desk!'" says Tommy Chen.

"I've got three Mac Quadras. Top of the line.

Put them together and that almost adds up to a Mercedes."

rassing loss of face for the Kuomintang. By 1983, more than 80,000 students had left Taiwan to study abroad and only 15 percent had returned. In 1984, Taiwan's 20,000-strong student delegation in the US was the largest of any foreign country. Today, that generation is returning to a transformed nation.

Today, Taiwan's per capita GNP approaches US\$11,000. Land prices in Taipei have skyrocketed. Night markets in which shoppers chose their own chickens and watched their throats cut (to guarantee freshness) have been replaced by Hong Kong supermarket chains. The city is a chaotic jumble of subway construction, cracked sidewalks abutting brand-new luxury hotels, and endless noise.

But just an hour's bus ride south, on the outskirts of a bustling town called Hsinchu, the Taipei-style anarchy has been tamed, at least within the boundaries of the Hsinchu Science-based Industrial Park, the jewel in Taiwan's high-tech crown. It is hard to imagine an environment more at odds with the madness of Taiwan's nearby capital city.

Hsinchu is the planned half of Taiwan's love affair with computer technology, the place where government activism has channeled Taiwan's energy to create the sixth-largest producer of information-technology

The park's final drawing card is location: it sits smack upon a fiber backbone connected to the nation's telecommunications network, giving park enterprises great Internet access. That's important, Wu says, half jokingly: "We can't live without our e-mail." In fact, Taiwan's Internet traffic is greater than Japan's.

By the Shores of Man-Made Lake

David Tsao, an electrical engineer who earned a PhD from the Polytechnic Institute of New York in Brooklyn, spent most of the 1980s in New Jersey working for Bell Labs. "But business," he says, "is in my blood." So four years ago he returned to Taiwan to start his own company. A solidly built, round-faced man, Tsao is now chair and CEO of a 2-year-old, 50-employee business based in the park, a company he founded with several other Taiwanese alumni of Bell Labs.

Double E's like Tsao who live in the park have homes lining the shores of Man-Made Lake. They drive to work on wide, empty streets with names like Research and Development East Road and Technology Avenue. Shaded by identical 15-year-old trees, their offices and laboratories are, for the most part, in nondescript gray concrete buildings inhabited by companies whose names, like the

announcing the park's imminent founding in Beikang, a suburb of Taipei - will reap the same kind of harvest as Hsinchu. Similar efforts to promote the automobile and aerospace industries were dismal failures.

Part of the problem is Taiwan's own success. Martial law ended in 1987 - as economic growth continued, dissidents applied mounting pressure for representation, and the government moved to improve its image overseas. The Kuomintang legalized opposition parties, lifted press restrictions, and held free elections. It is no longer possible for the Kuomintang to unilaterally dispense tax breaks, clear public land, and budget hundreds of millions of dollars for a state-of-the-art research lab. Today, a growing portion of the legislature is made up of opposition lawmakers who daily demonstrate the full meaning of the word obstreperous. They cast a cold eye on proposed expenditures, particularly those that might involve tax relief for companies with close ties to Kuomintang legislators. The consensus opinion in Hsinchu: industrial policy in an open democracy is much easier said than done.

But just how crucial was industrial policy to Taiwan's flourishing high-tech industries in the first place? The computer industry itself, experts say again and again, started by accident.

National Compulsions

Back in early 1982, everyone in Taipei was playing games.

Taiwanese companies churned out knock-off versions of *Space Invaders* at a furious rate. Arcades sprung up all over the city. And then, in March 1982, the Kuomintang banned the manufacturing of videogames. Not to anyone's surprise: the government had for decades taken a dim view of any activities that might impact negatively on the people's "morale" - public dancing, gambling, a free press, opposition parties. Videogames joined the list of all things *verboten*.

Taiwanese game manufacturers hardly blinked. They stripped the old games of their key components and used them in cloned versions of Apple II computers. Apple, in turn, filed a trade action against Taiwan and unleashed a legal attack so fierce that the infant Taiwan computer makers quickly abandoned copycatting Apple IIs and moved into the far more friendly arena of IBM-clone manufacturing.

By September 1982, the Ministry of Economic Affairs designated the information industry a "strategic industry" and instructed the Industrial Technology Research Institute,

a close neighbor to the Science-based Park, to develop IBM PC-compatible technology. As a result, even today, the domestic market is almost entirely IBM-compatible.

Taiwan's craze for videogames was a perfect example of "overabundant impetuosity," and it wasn't the last time, by a long shot, that the whole country lost its mind en masse. Throughout the mid-1980s and into the '90s, similar fads swept the island. An obsession with a Hong Kong lottery brought Taipei to a halt whenever winning numbers were announced. In 1991, some 500 cable franchises were wiring up the island in a frenzy of competition. In restless pursuit of the latest developments in telecommunicated money-making, Taiwan's gap-happy go-getters have suddenly charged towards the latest digital El Dorado: home shopping.

A hustling 29-year-old named Tommy Chen is one person poised to take advantage of the current home-shopping madness. Chen is a hardware tinkerer who has designed software and hardware for a cable home-shopping company. He is also one of the thousands of Taiwanese who have taken advantage of decades of economic growth to travel by car instead of the ubiquitous motorcycle, but his Daihatsu Charade is hardly the stuff of his dreams. A tiny two-door vehicle hardly longer than it is wide is not the kind of car that carries much weight with Taiwan's nouveaux riches, the sort of people Chen is constantly hustling for investment capital.

"They don't like my car," says Chen. "They look at it and go, 'Where's your Mercedes? If you're so good, how come you don't have a Mercedes?'"

"Give me a break!" he shouts, slamming his hands against the steering wheel. "I tell them, 'My Mercedes is on my desk! I've got three Mac Quadras. Top of the line. Put them together and that almost adds up to a Mercedes.'"

Parking in a narrow alley, Chen passes a liquor store with cases of Remy Martin XO stacked in the window, and a golf club store (10 years earlier, the alley might have housed a family of five stuffing chopsticks into paper holders or assembling electric fans). In a building whose discreet sign announces the Taiwan Video Shopping Network, Chen finds Bronson Bao.

Bao, who says he used to be a product marketing agent for Intel, claims that TVSN was the first purely cable home-shopping network in Asia, and already, in only its third year of operation, reaches a million households. But profit growth, which he says reached nearly US\$5 million in 1993, an 800 percent increase over 1992, has already begun to slow. TVSN's first competitor

arrived after only a year and a half.

"And in the last six months," says Bao, who let Chen know that he just traded in his Dodge Dynasty for a minivan, "we've seen 40 to 50 new competitors."

Made - and Designed - in Taiwan

Tommy Chen and his Daihatsu Charade provide just one example of a pattern that plays itself out millions of times over in Taiwan: he is the tireless hustler with 10 different projects in the air at once. But he is also an example of the close kinship that many Taiwanese, especially men, seem to feel to technology. It's a kinship that breeds the thousands of electrical engineering and computer science PhDs that Taiwan churns out each year, a passion for computer guts that packs Taiwan's many bookstores with pale teenagers poring over Unix manuals and C++ programming textbooks. While some critics of Taiwanese society say that this mass youth movement into geekdom is another result of repressive Kuomintang cultural policies in decades past - "there was no room to think about art or culture," declared one dissident - there's still no denying that techno-infatuation culturewide is a valuable trait for a nation in the 1990s.

Particularly a nation as industrious as Taiwan. The days are long gone when a customer could make a single phone call in Taipei, order any kind of software from the latest edition of Autodesk's AutoCAD to an up-to-the-minute upgrade of Lotus 1-2-3, and then pay a flat rate, per-disk charge to the guy on the motorcycle who arrived half an hour later. A flurry of copyright and other intellectual property laws has been enacted in the last four years, and some of them, swear officials at the de facto American embassy in Taiwan, are actually being enforced. In 1991 the US labeled Taiwan the Number One counterfeiting country in the world. Now Taiwan is earning a hard-won reputation for original design, both in hardware and software.

"Made In Taiwan." Hsinchu's engineering elite relish rolling out the phrase as an acronym: MIT. Made in Taiwan used to convey all the sorry romance of plastic forks and counterfeit Rolexes. Now, to the ears of the Double E's, it suggests high-tech mastery and hints of a future in which Taiwan has become the "Switzerland of Asia" - the R&D center for all of Greater China. They demur at the idea that they might one day be world leaders in technological development, but they are confident that whichever way the world goes, Taiwan will be right there, weaving through the thick traffic of international markets. ■ ■ ■

Cyber-Deterrence

◀ 122 written by Bruce Sterling for *Wired* (see "War is Virtual Hell," issue 1.1, page 46). What does it mean when *Wired* is appropriated for the Army's information war? Perhaps in the new era of simulation, Sterling's writing, as well as my own reportorial presence at Fort Irwin is just one more chip in the Army's motherboard.

As early as 1964, after reading a breathless promotional account of the "cyborg" under development by General Electric (from the photographs the cyborg looks like a robotic elephant), architect and social critic Lewis Mumford warned of the coming of a new "technological exhibitionism." Soon, he believed, this perverse display of military technology would pervade all of society.

Was I bearing witness to an even more powerful hybrid? What happens when you combine media voyeurism, technological

Digitization, making ever more convincing simulations possible, seems destined to replace an increasingly irrelevant nuclear balance of terror with a simulation of superiority.

Moreover, the digitized deterrence machine bears an important similarity to its nuclear counterpart: it does not necessarily have to work to be effective. Its power lies in a symbolic exchange of signs – give or take the odd reality check in the desert to bring religion to the doubters. This is the purpose of spectacles like *Desert Hammer VI*: to render visible and plausible the cyber-deterrent for all those potential snakes that might not have sufficiently learned the lesson of the prototype of cyberwar, *Desert Storm*.

Here at Fort Irwin, the desert functions again as a backdrop for the melodrama of national security. The effect of *Desert Hammer* is to turn von Clausewitz on his head. Military maneuvers are no longer about dispersing the fog of war, but about

lived social and bodily realities in which people are not afraid of their joint kinship with animals and machines...."

There are cyborg alternatives to be found in the desert. Heading back at the usual hellbent speed from the battlefield on day two, I asked the major over wind and noise about the strange warning sign that had caught my attention early in the morning. "Desert tortoise," he shouted. "Fifty thousand dollars if you kill one." I had to wait until we returned to the base to find out whether that was the bounty or the penalty. In asking, I learned that the tortoise had been assigned threatened species status in 1990. And since Fort Irwin encompasses some of its main breeding grounds, a clash of armored vehicles and armored reptiles was inevitable.

What was the Army to do? It decided to go green, or at least a slightly muddy version of it. The following morning, I met with Fort Irwin's civilian environmental scientists, enlisted by the military to protect the tortoises. Judging from their intensive prep and genuine enthusiasm, they didn't get many opportunities to sell their eco-wares to the press. After all, how could a lumbering desert tortoise possibly match the media appeal of an M1 tank going flat-out?

After the briefing, the tortoises' appeal was evident. The slide show was informative ("Without our help, the survival rate of the tortoise is 1 percent"), moving ("To a raven, a freshly hatched tortoise looks like a walking ravioli"), and amusing ("Here we see several tortoises in parade formation after completing their training at Fort Irwin").

The scientists claimed to be matching the warfighters chip for chip in the information war. Tortoises were tagged with transmitters, tracked by radio telemetry, and graphed in grid locations by computers. Landsat satellites were used to identify good habitat areas, aerial mine detection technology to find tortoises moving on the ground, and electronic sensors to warn off vehicles that might endanger the creatures.

Surveillance and communications technology was binding humans and tortoises into an interdependent community. By the end of the briefing, I began to believe that I had just witnessed the telling of a postmodern fable. Perhaps, with a techno-ethical assist and a leap of faith, the tortoise might yet beat the tank.

I knew it was a stretch – and not quite Aesop – but what more can one expect when machines take the place of animals in the imagining of the human race? ■ ■ ■

On a quest since Vietnam to fight only quick, popular, winnable wars, and imbued by the spirit of feudal Chinese strategist Sun Tzu (who wrote that "those skilled in war subdue the enemy's army without battle"), the 21st century Army has perhaps found in the cyber-deterrent its Holy Grail.

exhibitionism, and strategic simulations? News flash: In the 21st century Army, you get the cyber-deterrent.

If this sounds far-fetched, consider the worst-case scenario that currently underlies strategic thinking. As CIA Director James Woolsey put it at his confirmation hearings, a "bewildering variety of poisonous snakes" has sprung forth from the slain dragon of communism. When the dragon expired, so did the mighty, if illusory, deterrence value of nuclear weapons. On a quest since Vietnam to fight only quick, popular, winnable wars, and imbued by the spirit of feudal Chinese strategist Sun Tzu, who wrote that "those skilled in war subdue the enemy's army without battle," the 21st century Army has perhaps found in the cyber-deterrent its Holy Grail. The cyber-deterrent is fast, digitized, and is as spectacular in simulation as it is global in effect. With the price of nukes falling and their availability increasing, the digitized option has the added advantage of being out of reach of all but the richest rogues. And it makes a hell of a photo-op.

stage-managing the special effects. Combining Disneyland, Hollywood, and Silicon Valley, the National Training Center, full of video cameras and computerized special effects, not to mention thrilling rides, has superseded Los Alamos and the Nevada Test Site to become the premiere production set for the next generation of strategic superiority.

Can one conduct a critical inquiry into the information war without becoming just another informant for it, material for the Army's sequel, "(Re)Visions?" Biologist-turned-social-critic Donna Haraway, more sanguine than Mumford about the technological turn, offers a possible escape pod from the dilemma. In her embryonic 1985 essay, "Manifesto for Cyborgs," she wrote: "From one perspective, a cyborg world is about the final imposition of a grid of control on the planet, about the final abstraction embodied in a *Star Wars* apocalypse waged in the name of defense, about the final appropriation of women's bodies in a masculinist orgy of war. From another perspective, a cyborg world might be about

WIRED WARE

Colophon

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Color separations are made on a DS America 608 scanner linked directly to a 10-track Scitex system. Preliminary color corrections are performed on a Scitex Imager and proofed on the actual paper stock using a Kodak Approval digital color proofing system. Additional electronic prepress is performed in-house at Wired, using scans from the DS America 608, HP ScanJet IIc, Nikon Coolscan, and Kodak PhotoCD. Composed QuarkXPress pages are then converted to PostScript which is then translated into Scitex language using VIP 2.6 and sent through Gateway Tools 2.0 to the Scitex system's Micro Assembler. Composed digital proofs are submitted for final approval. Final film is plotted on a Scitex Dolev.

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The music that helped get this magazine out:

Ali Faraka with Ty Cooder, Talking Timbuktu; Shonen Knife, Rock Animals; Billie Holiday, God Bless the Child; Esquivel, Space Age Bachelor Pad Music; Arrested Development, Zingalamaduni; The Residents, Fingerprince; Bonnie Raitt, Nick of Time; Caetano Veloso and Gilberto Gil, Tropicália; Elvis Costello, Goodbye Cruel World; Ben Harper, Welcome to the Cruel World; Rob Wasserman, Trios; Richard Blade's Flashback Favorites #3, Sony compilation; Nick Cave, The Good Son; Richard Thompson, Mirror Blue; The Ramones, Acid Eaters; Ten City, That Was Then, This Is Now; Siouxsie & the Banshees, Hyena; Timbalada, Timbalada; Cyril Pahinui, 6 & 12 String Slack Key; Ensemble Alcatraz, Danse Royale; Baaba Maal, Fire'n'Fouta; Luscious Jackson, Natural Ingredients; Lee "Scratch" Perry, Scratch Attack; Massive Attack, Blue Lines; Clara Nunes, Best of Clara Nunes.

Drugs of choice: California Poppy & Valerian Root Extract, Keanu Reeves, WALprofen, Pez.

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Message 15:
Date: 9.1.94
From: Nicholas Negroponte
<nicholas@media.mit.edu>
To: Louis Rossetto <lr@wired.com>
Subject:

Why Europe Is So Unwired

Do you realize that in France the first six letters of a keyboard don't spell QWERTY but AZERTY? In March of this year, when French Culture Minister Jacques Toubon announced the decision to rid the French language of foreign (read: English) words by making it illegal (a US\$3,500 fine) to use such words in company names and slogans, I was sadly reminded of a 1972 job I conducted for the Shah of Iran. My task was to provide a color word processor – the Shah wished to see Farsi texts in which color depicted the age of a word. His desire was to understand his language rather than purge it. I suppose, by contrast, Minister "James Allgood" plans to change all stop signs to "Arrêt."

Given this backdrop of nonsense at the high-

French Republic – whom Mitterand referred to as his "personal computer," has written 17 books on everything from Europe to the history of time. So why didn't such a smart interface agent move into the digital generation? Because like most places in Europe, France is a top-down society, where a job is a place one occupies and protects. It is not a process of building, creating, and dreaming. Incentives for young entrepreneurs are almost nonexistent. Compared to their US counterparts, French young people are just not taken seriously.

Double-breasted wisdom reduces risk. A generally aging population enjoys stability and places confidence most easily in those who have had considerable and tested experience. Ballet

European and Japanese companies that combine the genius of the hacker with the drive of the entrepreneur. This is particularly important when the entry cost is nontrivial and distribution determines the difference between success and failure.

New ideas are not just about capital. They are also about risk and the willingness to take it. The flip side of venture capital is the risk young people are frequently willing to take with something even bigger. I have seen marriages fail, people work themselves to death (literally), and an obsession for success that overshadows every other human dimension. Good or bad, such obsessive commitment is a key part of many new ventures. The currency of achievement is often not money but personal fulfillment and passion, something too easily thwarted by the bureaucracies of a homogeneous, old society.

Many artistic, industrial, and intellectual movements are driven by distinctly national and ethnic forces. The digital revolution is not one of them. Its ethos is generational and young.

est level of government, is it much of a surprise that Europe is such a weak player in the computer and telecommunications industry? Of all fields, this industry is truly global and borderless. And as with air-traffic control, English is the lingua franca. Bits don't wait in customs; they flow freely across borders. Just try stopping them.

Wired's first World Wide Web page, for example, was developed in Singapore – a place whose support for freedom of the press is dubious, a place William Gibson referred to as "Disneyland with the Death Penalty" (Wired 1.4, page 51).

Many artistic, industrial, and intellectual movements are driven by distinctly national and ethnic forces. The digital revolution is not one of them. Its ethos is generational and young. The demographics of computing are much closer to rock music than theater. French rock star Johnny Halliday is allowed to sing in English, after all.

If Europe wishes to remain at the vanguard of culture, it must step off its high horse and look more imaginatively at the future. Maybe it is time to discontinue ministries of culture.

Being Wise Not Smart

Jacques Attali – special advisor for the last 12 years, since he was 38, to the president of the

dancers, downhill skiers, and mathematicians may peak at thirtysomething; CEOs and national leaders, by contrast, are groomed by the passage of time. The word "leader" presumes age, despite Alexander the Great, who at his death was six years younger than Bill Gates is today.

I happened to be in Paris in May 1968, when students my age took to the streets. I asked myself, Why are we, in the United States, so complacent and docile? Fourteen years later, I found myself working directly for the Elysée Palace. And, guess what? Many of the people orbiting Mitterand were the same people who had hurled paving stones through the tear gas in 1968.

Venture Void

When people ask me why so many new ideas in my field come from the United States, I talk about the respect we give to young people and to our heterogeneous culture. The real difference is our venture capital system, which is almost totally absent in Japan and Europe – where accountants intermix venture money with large leveraged buyouts. Therefore, the statistics do not show the real difference between them and the United States, where venture capital firms spent US\$3.07 billion in 1993. The result is many fewer young



The Nail That Sticks Up Highest

I was once asked by a former Japanese minister of education what I would do if I could do just one thing to improve the grammar-school system of that country. My reply: "Abolish uniforms."

While Europe has less obvious uniforms, educational freedom is still limited. Only England respects and even cultivates idiosyncrasy. The result of this lack of educational freedom is less playfulness and an infrequent convergence of intellectual cultures, which is where computer ideas have traditionally come from. One of MIT's most significant computer forces during the early '60s came from its model railroad club. Another came from the Science Fiction Society. Multimedia has disparate roots in storytelling, drama, music, and cinematography.

The point is that new ideas do not necessarily live within the borders of existing intellectual domains. In fact, they are most often at the edges and in curious intersections. This means that institutions like universities and PTTs have to embrace some very anti-establishment ideas. Europe's dominantly state-run universities and PTTs just don't do that very well. They run a close first and second for knocking down new ideas. The European Union is now faced with a global information infrastructure in which it just may not be a *playeur*. ■ ■ ■

Next Issue: Human Interface: Sensor Deprived

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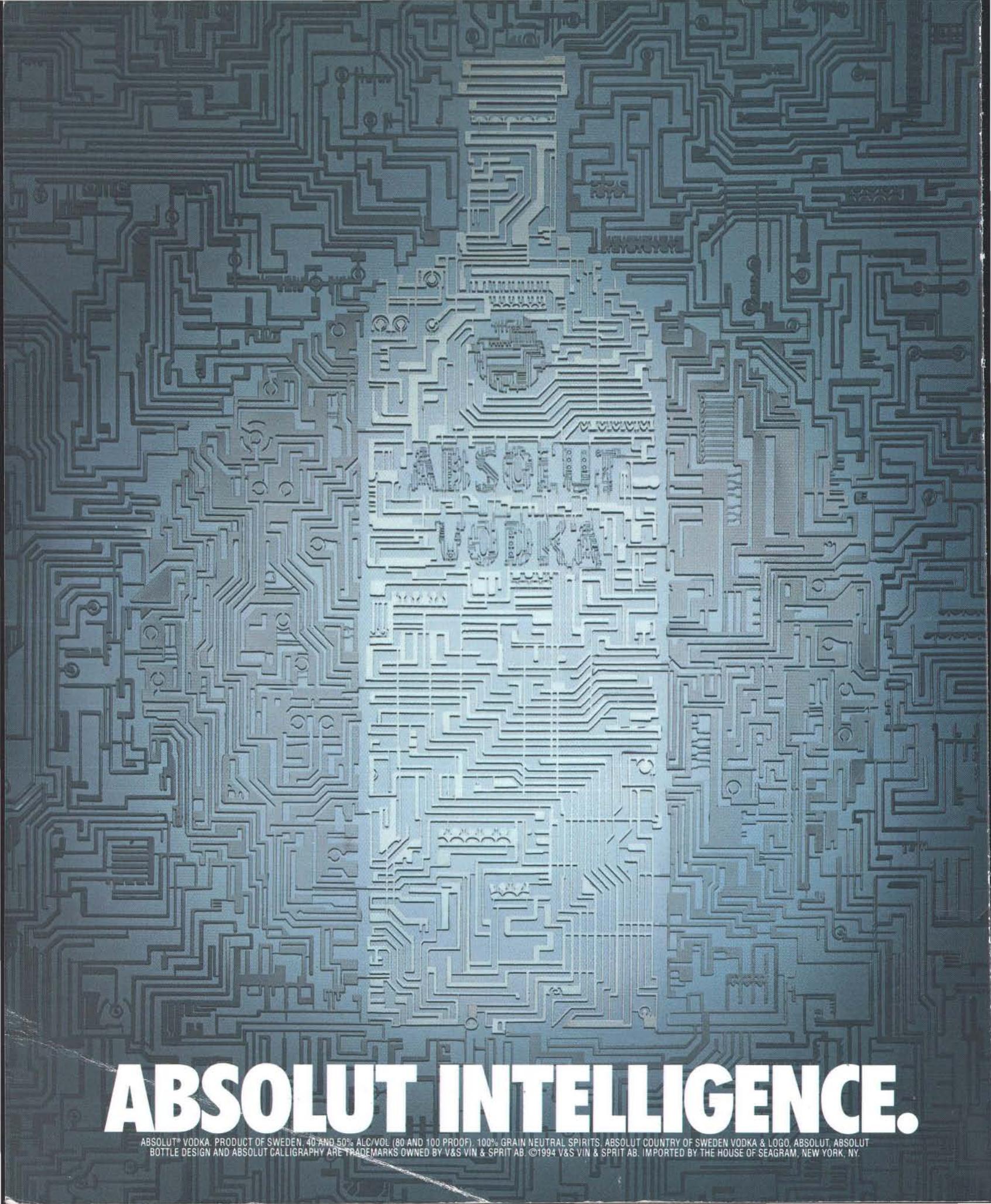


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